Gas Journal

VOL. 286. 108th YEAR. LONDON, JUNE 13, 1956. Nº 4848 PRICE 1/6

TECHNOLOGY DEPT.

for gas treatment and storage

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JUN 30 1956
DETROIT

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for the GAS INDUSTRY

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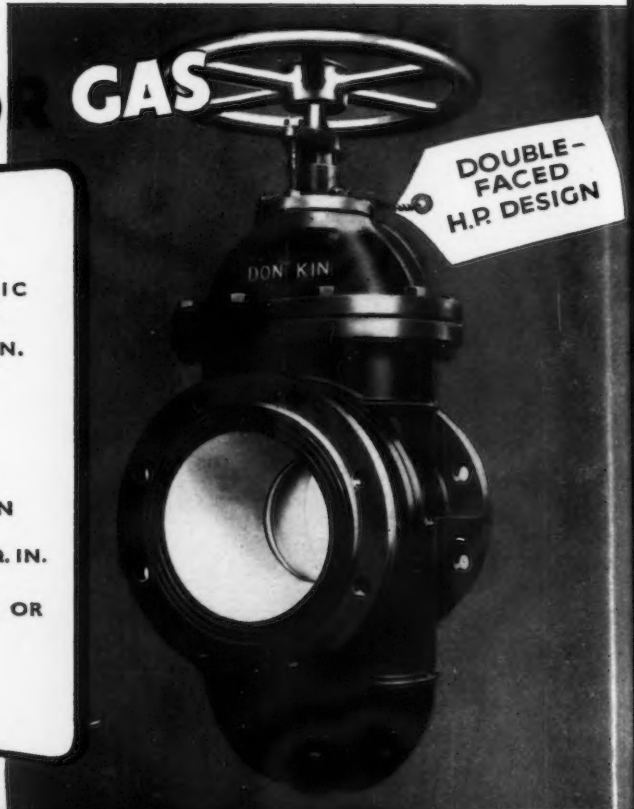

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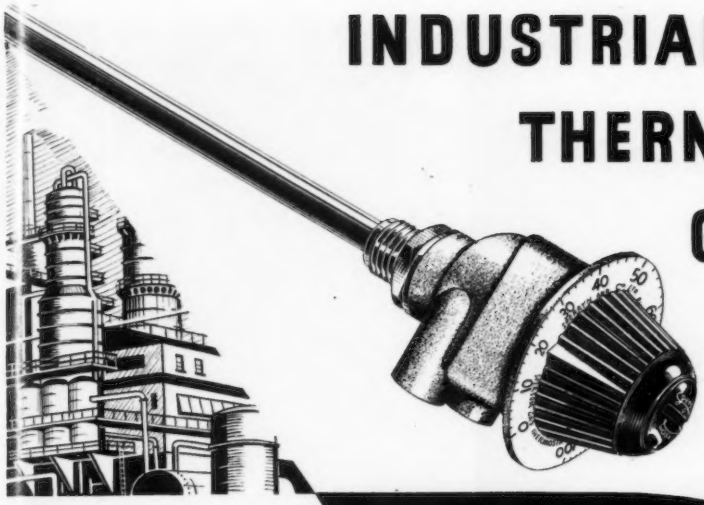

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Thermostats in this range include direct and indirect acting types for low, medium and high temperatures. Special models for bakers' ovens and fish frying ranges are also available. For complete details ask for Pamphlet No. R.G.7.

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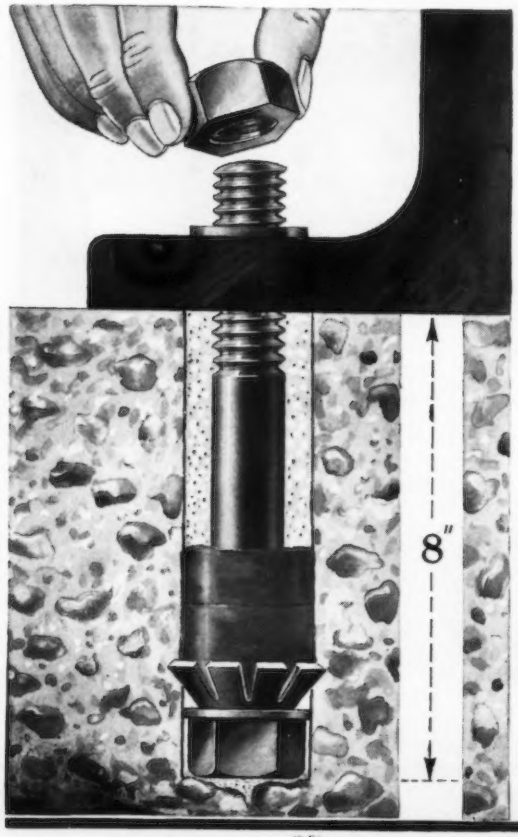

THIS BOLT (1¼" DIAMETER) FIXED AND CAULKED IN CONCRETE

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The Rawlplug Bolt Anchor is a fixing we supply for Heavy Duty Work especially where there is Vibration or Shock-loading—immensely strong, and easily caulked to withstand wet conditions. In this test the hole was drilled (8" deep x 2⅛" diameter) with a Rawlplug P.H. Bit in a pneumatic hammer, and caulked with a standard Rawlplug Caulking Tool. Concrete characteristics and working conditions vary so widely that it is impossible to generalise about times, but this test affords striking evidence of the extraordinary speed of the Rawlplug method as compared with any other—no grouting, no waiting for cement to dry.

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THE WORLD'S LARGEST MANUFACTURERS OF FIXING DEVICES

when atmospheric pollution is severe

— specify ATLAS Rubber Paints. These are products designed specifically for the complete protection of structural iron and steel work in foundries, sugar refineries, plating shops, canneries, dyehouses and other places where severe acid or alkaline fumes abound and corrosion is rife.

We will gladly give you technical advice on the best use of ATLAS Rubber Paints to meet your particular requirements.

Write to us now for colour card and price list.

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TAS/AS 163

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HIGH GRADE REFRACTORIES FOR COKE OVENS, GAS WORKS, ETC.

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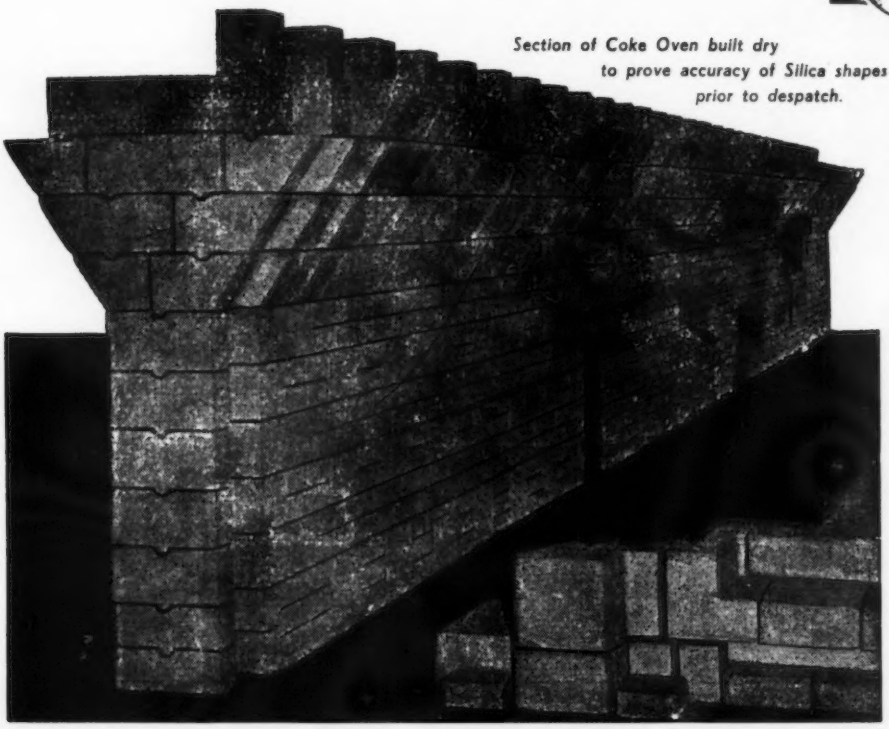
SPECIAL NON-SPALLING HIGH-ALUMINA MATERIALS FOR DOOR JAMBS and BOTTOM SECTIONS OF VERTICAL RETORTS

Our Technical Department is always available for consultations on recent developments.



Section of Coke Oven built dry to prove accuracy of Silica shapes prior to despatch.

IT PAYS TO USE CONSETT REFRACTORIES

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Silvertown Conveyor Belting . . .

. . . has already handled 400,000 tons of hot coke

Here's proof of the toughness of Silvertown belting . . . of its ability to handle successfully a great quantity of hot and extremely abrasive material. And despite these punishing conditions the belt is good for the handling of a great deal more. . . .
There's a Silvertown conveyor belt for every service and operating condition. If your loads are heavy, hot or wet—or of greasy or abrasive material—call in Silvertown and learn how these longer-lasting belts will cut your handling costs.

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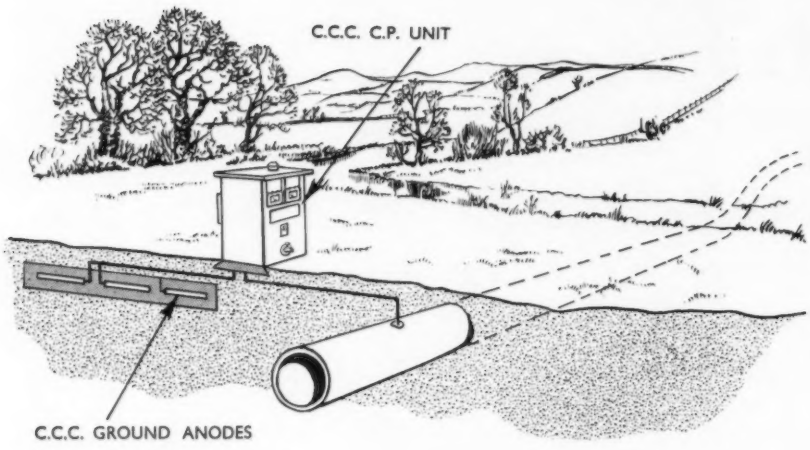
C.C.C. PROTECTION for BURIED PIPELINES



Cathodic protection for the prevention of corrosion of underground pipelines is probably the most widely used application of electrolytic corrosion control. It is standard practice nowadays to apply cathodic protection to all new pipelines, and lines of long standing can be successfully protected even if uncoated.

Our experience in this type of work is very considerable, and we supply all the materials, and offer all the necessary services from the preliminary surveys to the final maintenance checks.

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C C C

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Welding along the line with Lincoln Multiweld O.V.

13½ miles of all-welded gas main completed ahead of schedule in Bedfordshire

The new 13½-mile gas main from the main Bedford Gas Works to the Sandy and Potton areas was completed well ahead of schedule by Messrs. Biggs, Wall & Co. Ltd., contractors to the Eastern Gas Board.

This gas main, of 8″ diameter mild steel, was welded entirely by Lincoln Multiweld O.V. electrodes. The rigid specification laid down by the Chief Engineer, Eastern Gas Board, insisted on only the best and most suitable electrodes for this exacting job. All the welds were examined by Gamma Ray for perfection by Messrs. Welding Supervision Ltd.

Multiweld O.V. give *the best work in the shortest time.* A mild steel electrode with a heavy extruded coating, designed for AC or DC use, it is efficient in all positions and especially useful for high speed fillet welds. Outstanding characteristics are:—very stable arc; ease of striking arc; excellent bead finish; very low spatter loss; exceptionally easy slag removal; high quality weld metal; exceptionally high deposition rate; generally easier to use than any similar electrode.

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British made

Write for free brochure on the Lincoln Multiweld Electrode available on request from Dept. T

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There are no indiscriminate, sledge-hammer tactics when Wards tackle a dismantling job. Right from its inception the procedure is a smooth-running sequence of planned operations aimed at recovering the biggest possible proportion of plant, machinery, parts and materials for re-use in one form or another. When, therefore, we refer to 'constructive advice on dismantling' we mean, quite briefly, that Wards' long experience and specialised knowledge of industrial recovery values is wholly at the client's service from the very beginning of any contract.

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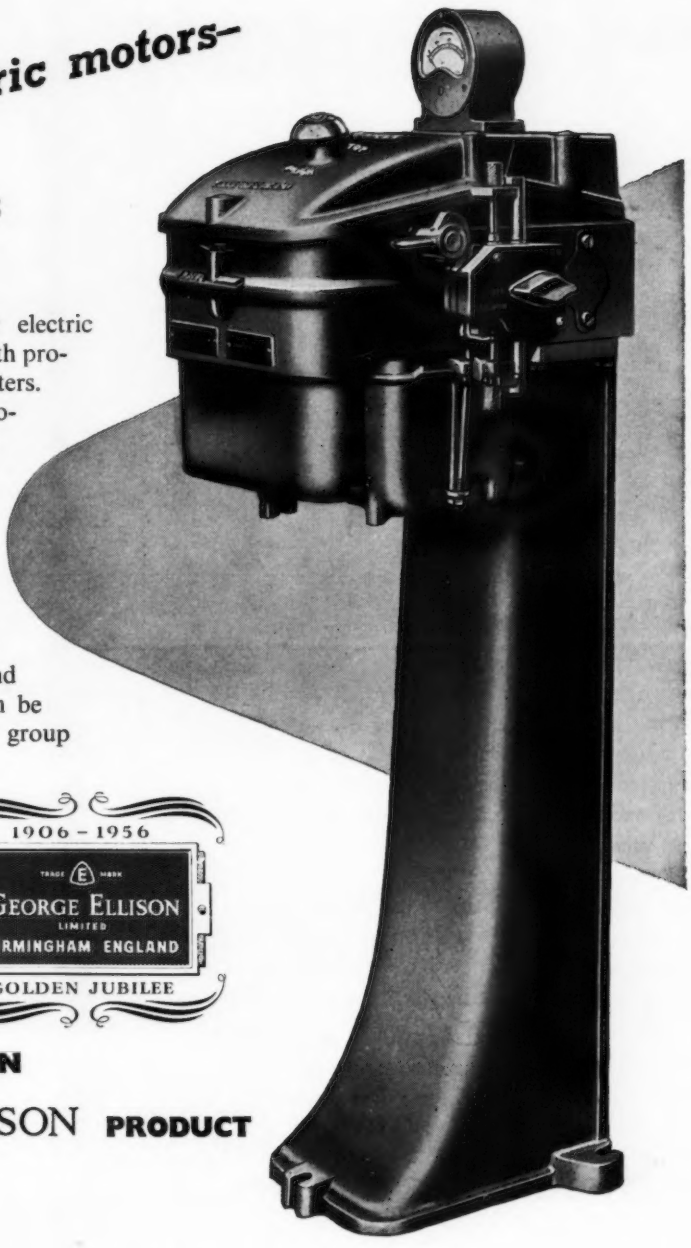
D/11

FULL protection for electric motors—

with Ellison starters

Full and reliable protection for electric motors and minimum interference with production is assured by 'Ellison' Starters. The quick-resetting, overcurrent protective devices are a sure safeguard against motor 'burn-outs', and time-lags prevent unnecessary stoppages caused by temporary surges.

The new A.S.T.A. tested 20 amp. direct-to-line starter illustrated has many notable features, including built in isolator, H.R.C. back-up fuses (optional), safety interlocks and long life contacts. Arrangements can be made for sequence starting and for group mounting on a busbar chamber.



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One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking.

Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have exceptional value.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained whenever Gunite is applied.

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Handbook " GUNITE " sent on request

Exact Duplication—

Don't get the hump about elevator bucket replacements. For exact duplication of whatever pattern you need—

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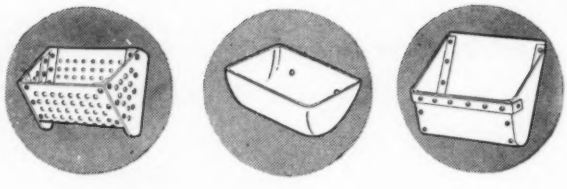

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Tottenham gas undertaking chooses "JOHNSON"

Nine Hylo-veyors stockpiling and reclaiming coke at new plant

The designers of the new coal and coke handling plant at Tottenham selected Johnson Hylo-veyors to transport vertical retort coke to and from the stockpile. Nine Hylo-veyors are used. One is an adaptation of the Hylo-veyor/Loband Loader combination modified to accept feed from a power shovel into a 2 cubic yard capacity hopper, and to meter this coke onto the other conveyors at a predetermined rate. The coke then passes down seven 40' Hylo-veyors, finally moving along the ninth to be discharged into the hopper of a stacker. For literature about Johnson Hylo-veyors (which are capable of rates of 200 tons/hour) write for illustrated leaflet GJ/6/6738.

C. H. JOHNSON (MACHINERY) LTD., ADSWOOD, STOCKPORT, CHESHIRE. *Telephone: STOckport* 2642/5. *Telegrams: 'Machinery' Stockport. London Tel: Prospect* 7671 *Glasgow Tel: Kilmacolm* 558

I see it's a **JOHNSON MACHINE** that's good!

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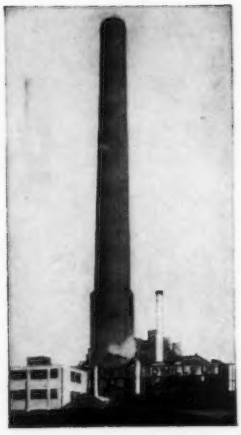
From the investigation of the site to the completion of the job, the Cementation Co. Ltd. provide a complete world-wide service on foundations and underpinning, which is unrivalled for experience, facilities and resources.

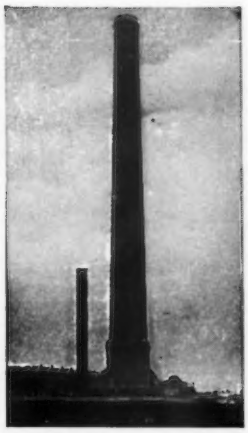
Time has proved, over and over again that concrete piles and cementation methods not only give the greatest strength and stability to many types of foundation, but are often the only solution in certain difficult conditions.

In addition there is no harmful vibration, distortion or excessive noise during construction.

The successful completion of over 4 million feet of Bored Piling during the last fifteen years is an achievement which speaks for itself.

Left : Trial borings for reconstruction of Coventry Cathedral.





Two of the largest chimneys in the British Isles; on foundations of Francois Concrete Piles (left) and Francois Cementation Piles (Right)

Write for your copy of our new booklet about Bored Piling.

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GAS CONTROLLERS & COMETS

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Write today for full details.

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The "Newhome" Kitchenette Model No. 150 and the "Argyll" Hotplate Model No. 171 are invaluable assets where space saving is a consideration.

These two attractive designs are admirable in performance and presented in "Superl" Vitreous Enamel—the finish with an excellent reputation.

You always get the best out of a . . .

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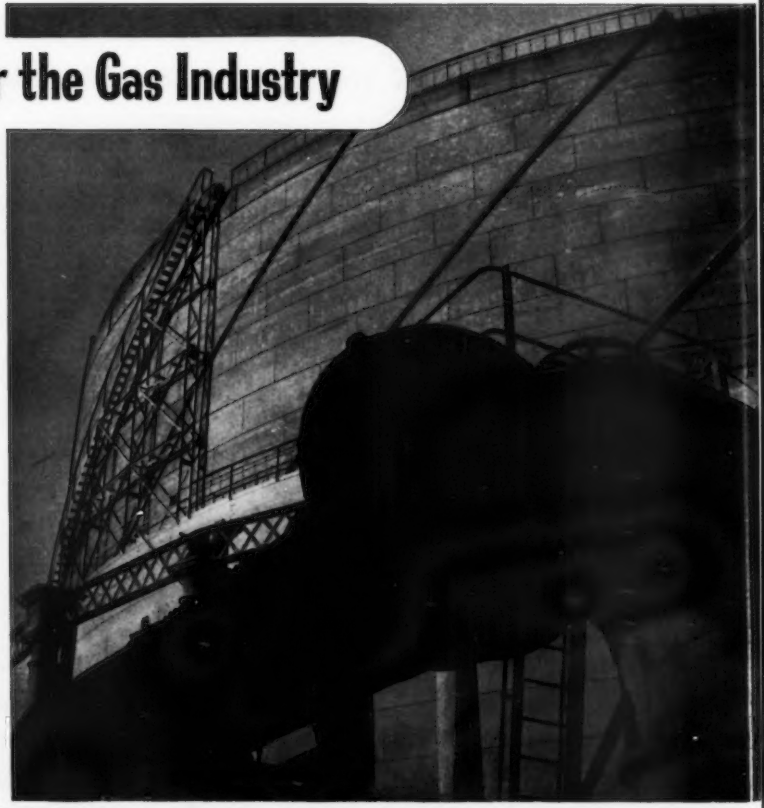
Aluminium Paints for the Gas Industry



"LUMEROS X" High Heat Resisting Paint. Represents the latest and greatest advances in the protection of iron and steel subject to very high temperatures. "LUMEROS X" gives adequate protection at temperatures up to 600°C. Good water resistance. No undercoat required. Available in Aluminium or Black.

"METTAL" Aluminium Paint.
A general purpose paint of the highest quality and durability and possessing great brilliance. For indoor and outdoor use. Whilst not specifically designed as a heat resisting coating "METTAL" will stand temperatures around 212°F (100°C).

"METTAL" (Thermal).
Specifically designed for indoor and outdoor use on metal surfaces up to 350° F (177°C).

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A wealth of experience gathered over 146 years in the design, construction and installation of plant for the Gas Industry cannot be too highly valued, but we look ahead to the fields yet to conquer.

We are at your service at all times.

Balfour OF LEVEN

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A MEMBER OF THE BALFOUR GROUP OF COMPANIES

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20 to 25 tons of coke de-breezed and bagged per hour

with the SMITH HARMER coke loader

This modern coke loading machine was invented by the head of the Materials Handling Dept. of the Gas, Light and Coke Company and developed in collaboration with Smiths of Rodley. The bucket scoops up about 7 cwt. of coke at a time, separating the breeze and delivering cleaned coke into 1 cwt. bags. The whole operation from the ground pile to the bags is performed as quickly and cheaply as the delivery only from a modern coke hopper. The machine illustrated is capable of handling 20-25 tons of coke per hour. It is available with either pneumatic tyres or crawler tracks as desired. Larger machines are available mounted on crawler tracks and are capable of handling 40-45 tons per hour.

Illustrated leaflet available on request.

Smiths OF RODLEY

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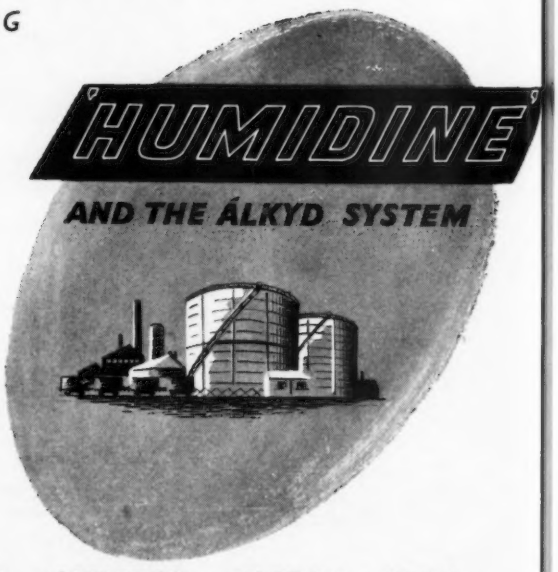
2 PAINTS FOR THE GAS INDUSTRY

NON-SETTING & SETTING

One coat of non-setting 'Humidine' forms an impenetrable permanent barrier against corrosion and provides ideal protection for lower lift plates and cuppings, purifier lutes, governor bells and meter drums. 'Humidine' never dries and therefore never cracks. It is impervious to moisture and can be applied under water.

★ **Wherever the metal to be painted is in physical contact - use Aspinalls' Alkyd Gasholder paints. They are a worthy companion to 'Humidine'.**



ASPINALLS (PAINTS) LTD. : CARLETON : SKIPTON : YORKS.

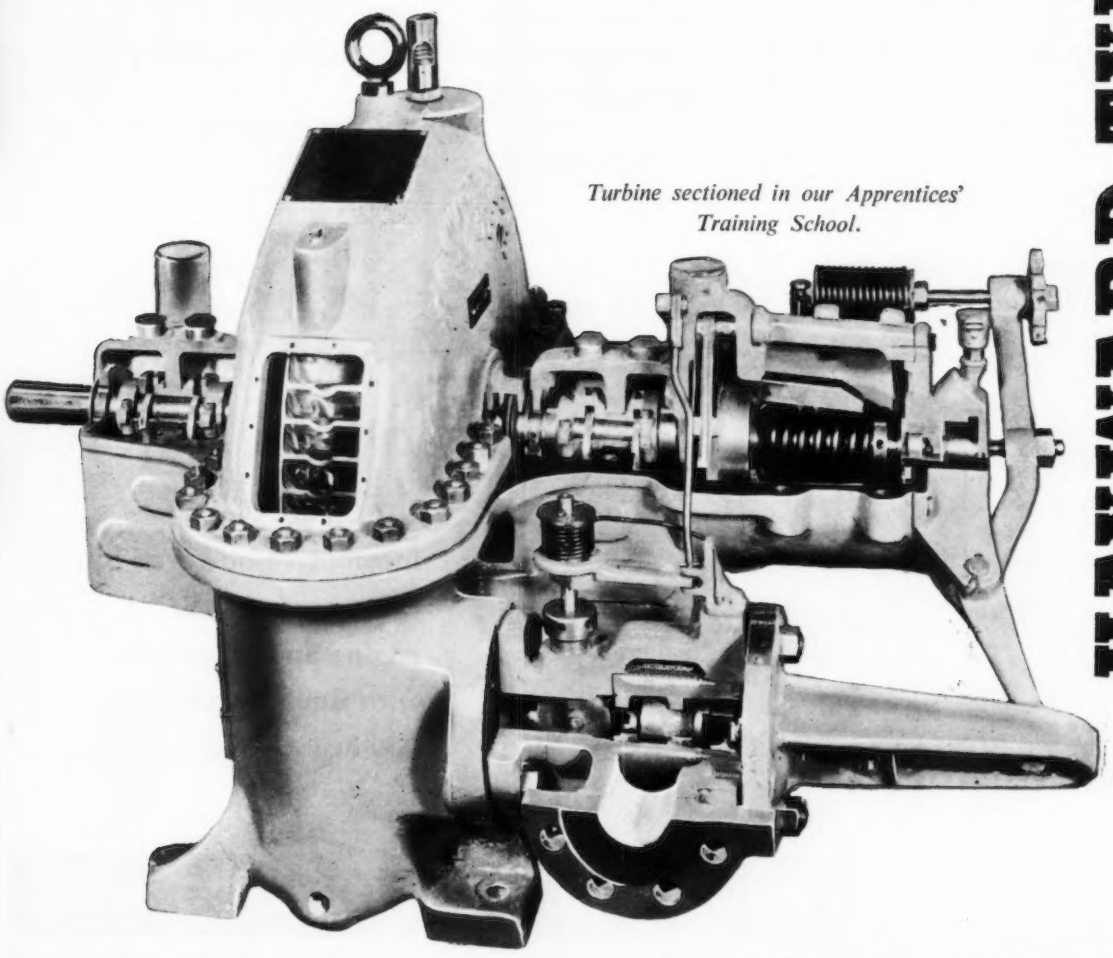
DMAL. 55

750°F

Improvement in the design of the Hayward Tyler-Terry steam turbine now makes it suitable for steam temperatures up to 750°F without the necessity for force feed lubrication.
This further widens the field of application for these simple and robust prime movers, already used in large numbers for driving Fans, Blowers, Compressors, Pumps, Alternator Sets and Asynchronous Generators.

Type Z	5 to 150 H. P.
Type ZS	5 to 200 H. P.
Type G	75 to 575 H. P.

Other Hayward Tyler products: Process Pumps, Chemical Pumps, Oil Cargo Pumps, Submersible Borehole Pumps.



Turbine sectioned in our Apprentices' Training School.

HAYWARD TYLER

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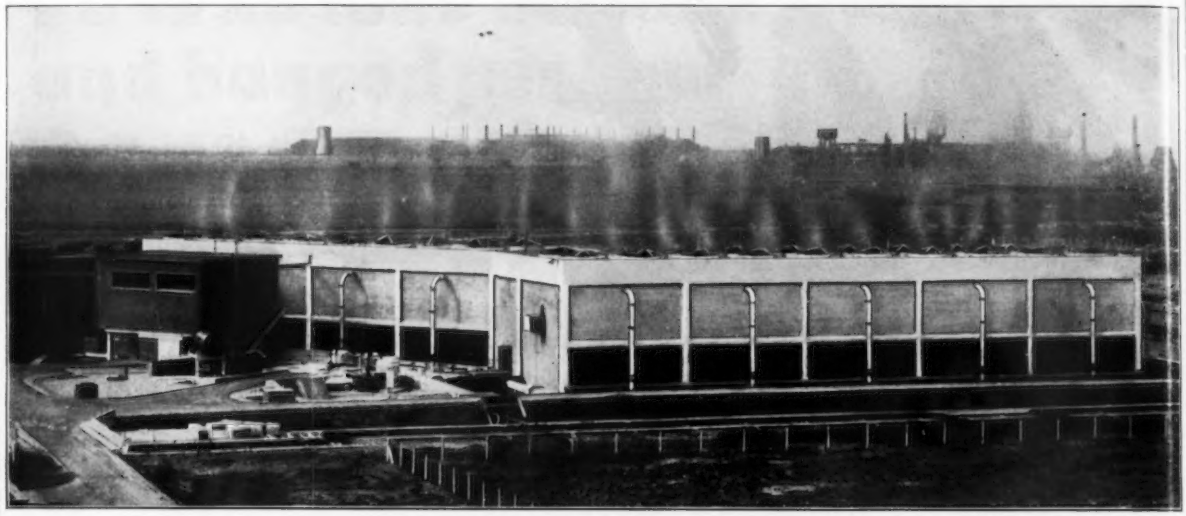

THE ABOVE ILLUSTRATION DEPICTS A WATER COOLING TOWER INSTALLATION OF THE MECHANICAL INDUCED DRAUGHT TYPE. TO ACHIEVE THE VERY EXACTING DUTY SPECIFIED A TOTAL OF 36 FANS ARE EMPLOYED WHICH ARE SITUATED IN THE ROOFS OF THE TOWERS. THE INTERNAL FILLING IS EXCEPTIONALLY COMPACT, CONTAINS THE LATEST IMPROVEMENTS AND IS SO DESIGNED TO MINIMISE OPERATIONAL COSTS. IN THE BACKGROUND TOWARDS THE LEFT CAN BE SEEN A 160 FEET HIGH NATURAL DRAUGHT HYPERBOLIC TOWER FOR A SERVICE REQUIRING A LESS STRINGENT PERFORMANCE.

THESE UNITS ARE ALL PRODUCTS OF

THE DAVENPORT ENGINEERING Co. LIMITED
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WHOSE SPECIALITY IS THE DESIGN AND CONSTRUCTION OF
WATER COOLING PLANTS

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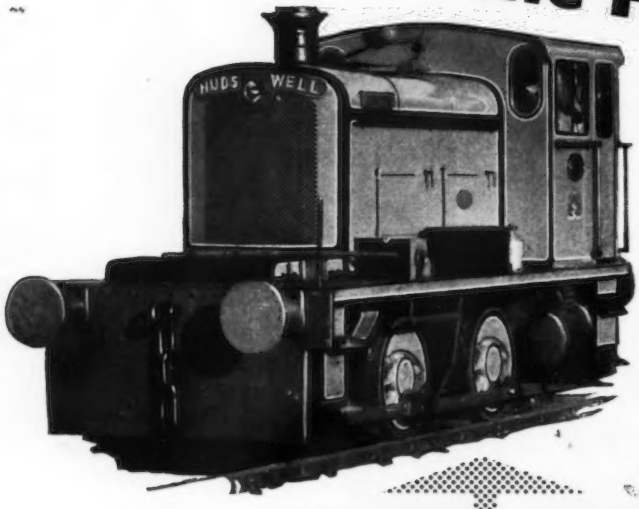

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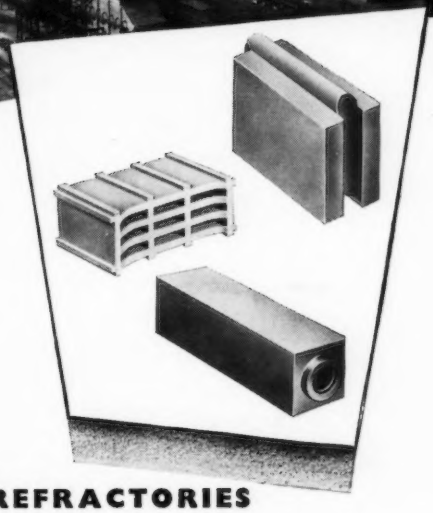

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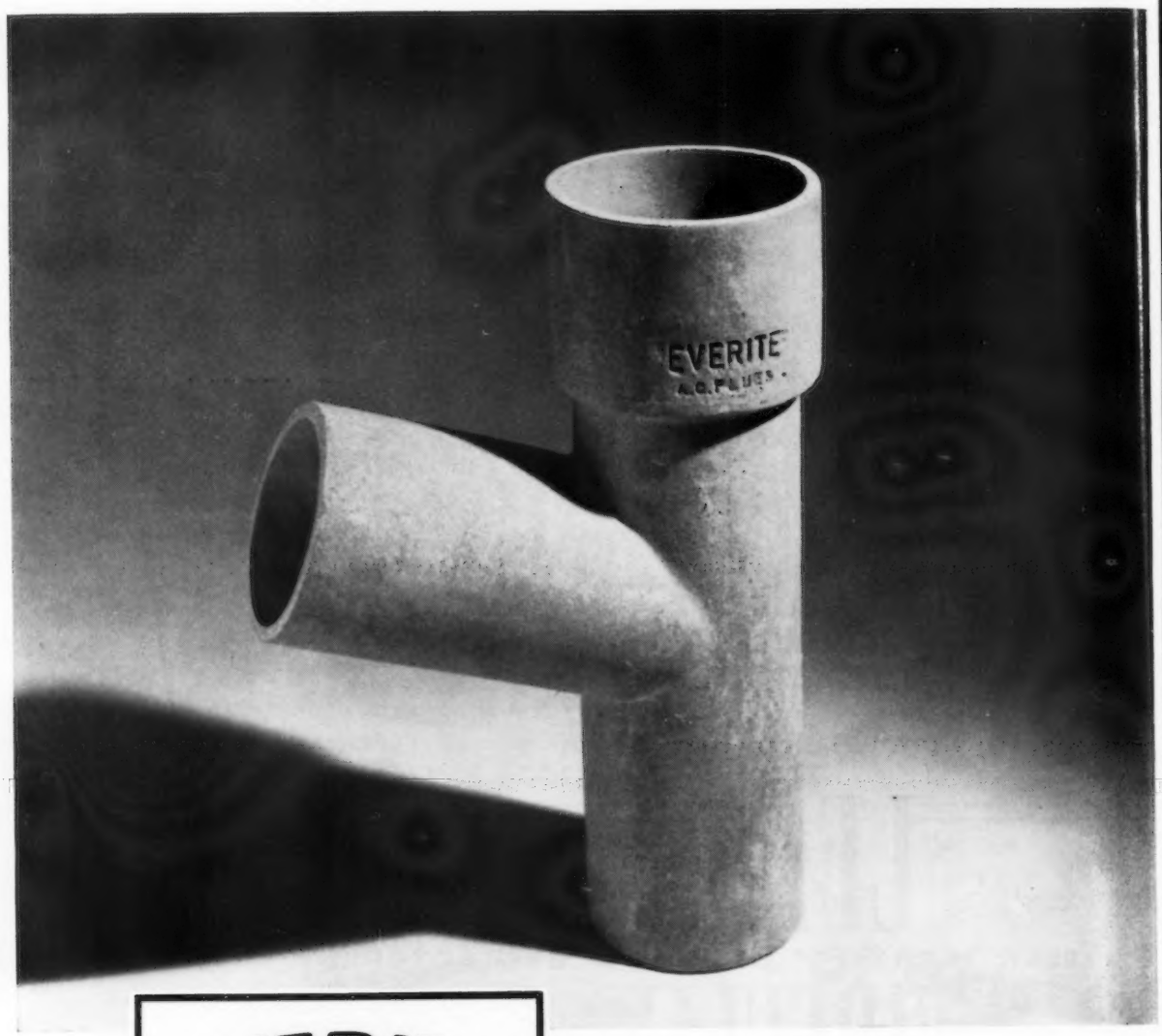

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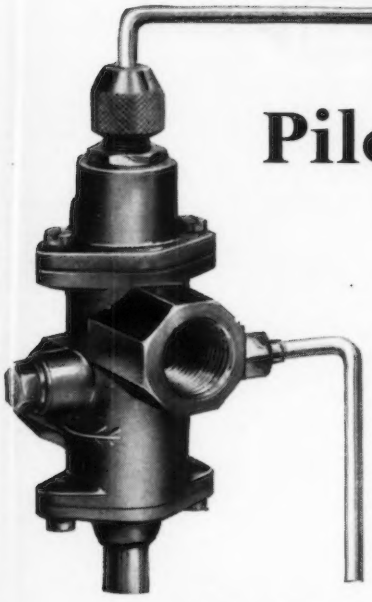

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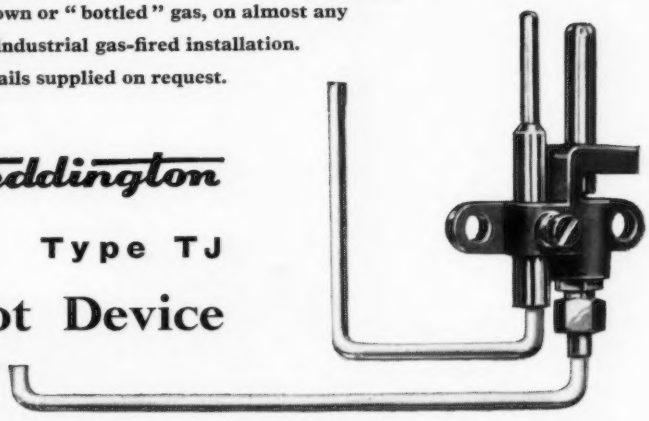

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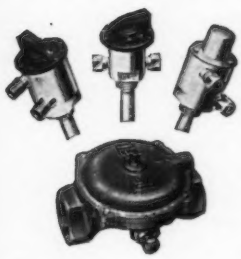

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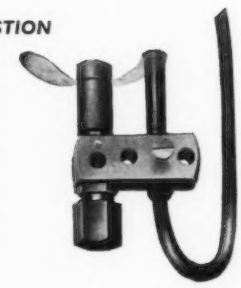

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Gas Journal

VOL. 286 *NO. 4848* *June 13, 1956*

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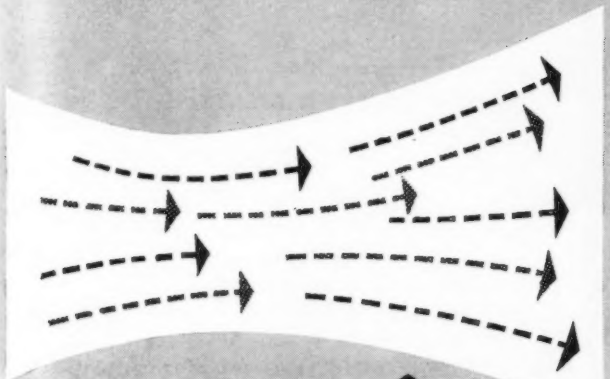

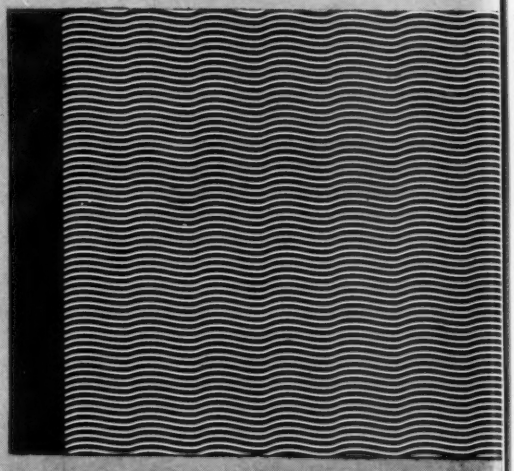

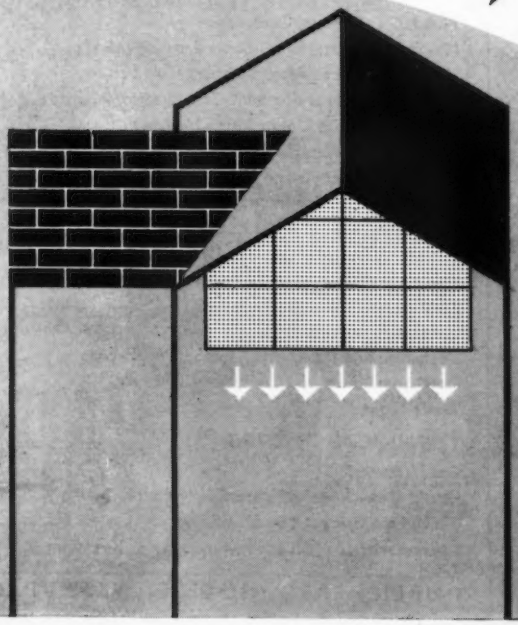

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S.H.2

Gas Journal

VOLUME 286. No. 4848. JUNE 13, 1956. 108th YEAR

Importing Natural Gas

IN this issue publication is commenced of an authoritative study by an American author, Mr. John D. Crecca, Jnr., of the problems and economics associated with the liquefaction, storage, and ocean transport over long distances of natural gas. In their paper on liquid methane to the Institution of Gas Engineers, Burns and Clark show how the transport of liquefied gases to England at an economic cost would assist the easing of the fuel situation in this country. Although most people have the Middle East oilfields in mind when the transport of liquefied gases to Europe is mentioned, Burns and Clark refer to Venezuela as an alternative source. As all the technological 'know-how' on this matter is American, it is not surprising that a great proportion of their paper should be concerned with American practice. Liquefaction offers tempting advantages when the movement of large volumes of gas is desired. Whereas compression to, say, 500 lb. per sq. in. will effect a volume reduction of 35 times, conversion to the liquid state effects a reduction of 600 times. Although the liquefied gas is more volatile than petrol it has, at 650°C., a much higher ignition temperature, while the lower limit of inflammability in air of 5% is appreciably higher than the 1.4% of petrol. With suitable precautions liquid natural gas is thus no more difficult or hazardous to handle than any of the usual hydrocarbon spirits. It is of course at a temperature approaching −160°C., and this calls for the use of selected metals in the construction of tanks, pipes, valves and fittings. Insulation has also to be considered, but a wide choice of materials such as slag wool, cork, balsa wood, and more recently, plastic foam substances, is available. The special metals used in the equipment are necessary as ordinary steels fail by embrittlement when subjected to the very low temperatures, while corrosion from frost formation has to be guarded against. For tanks and pipes a reliable material has been proved in the shape of 18:8 chrome-nickel stabilized austenitic stainless steel. This retains its ductility at very low temperature and is weldable without difficulty. For valves and fittings copper-nickel alloy metals are quite successful. Internal insulation of tanks is now preferred, as protecting the shell metal from cold shock. These materials and the associated technique are of course familiar in this country in the use of road transport for liquefied gases such as air and oxygen.

The potentiality of gas storage in the liquid form is demonstrated by the fact that a spherical stainless steel container of 57 ft. diameter, enveloped by three feet of cork insulation and enclosed in an outer steel shell 63 ft. in diameter held the equivalent of 50 mill. cu.ft. of free gas of 900 B.Th.U. gas.

Perhaps even more striking is the design, detailed in the study, for the conversion of a standard ocean-going oil tanker vessel, 500 ft. long and 68 ft. beam to carry a cargo of 3 mill. gal. of crude oil, and simultaneously the liquid equivalent of nearly 90 mill. cu.ft. of free gas. The greater part of the liquefied gas is carried in eight tanks, each roughly 27 ft. cube. These are formed by welded stainless steel plates, belted externally at six foot intervals with 18 in. flanges and internally lagged with 2 in. of balsa wood plus 10 in. of plastic foam. The tanks are flexibly supported in a series of separate, tolerably gas tight, compartments formed by pressed steel bulkheads, roughly 36 cu.ft. cube. The compartments are lined internally with glass fibre insulation to a thickness of 3 in. to 12 in. The free space around the gas tanks is kept filled with inert gas, generated on the ship, as also is the free space above the liquid. With these arrangements an evaporation loss of ½% of the cargo per day is likely to result. The compartments are surrounded by oil cargo tanks, which reach to the side of the ship at the side, and underneath as double bottom oil tanks. By locating the gas cargo in the centre of the ship, making the tanks flexibly attached, and by surrounding the gas tanks by oil tanks, protection is afforded against all hazards of the sea, *viz.*—collision, grounding, and rough weather, as well as from the heat of the sea and the sun.

The analysis of costs given in the study shows that liquefaction and sea transport between the Gulf of Mexico and Philadelphia, a distance of 1,890 sea miles,

is fully competitive with existing costs of transmission by pipeline of the same length. Costs from the same point to Southampton, 4,810 sea miles, are also estimated, and it would appear that natural gas from America could be delivered, were it to be available, in this country at a price sensibly below the into-holder cost of manufactured gas at present prices. Using the same methods it is clear, too, that natural gas can be quite well brought from the Persian Gulf area—7,000 miles—where there is no possibility of local demand. Extrapolation of the figures in the study, however, would seem to indicate that the cost of gas from this source will approach that of indigenous production much more closely. The Gas Council are pursuing their own investigations into this scheme and the parallel results will be awaited with interest.

Some 20 years ago Sir Alfred Egerton suggested that the storage of liquefied methane could provide the gas industry with an economical and efficient means of meeting winter peak loads. Using natural gas this proposal was successfully operated by the East Ohio Gas Company at Cleveland, U.S.A., from 1941 to 1944. It will be recalled that part of the equipment included three spherical containers each holding 50 mill. cu.ft. of free gas equivalent. Later a fourth container of toroid cylindrical shape of equivalent capacity of 100 mill. cu.ft. was added. This last container failed from embrittlement and, combined with other circumstances, produced a major disaster. As with other epoch making failures the lessons learnt have resulted in an exact knowledge of technique and safe practice which should ensure that no such event can take place again.

It will be remembered, too, that in April, 1951, a paper by Messrs. Haselden and Reis was presented to a joint meeting of the Institution of Gas Engineers and the Physical Society (Trans. I.G.E. 1950-1, pp. 980-1018). The authors proposed the abstraction of methane from town gas and its storage in liquid form as an economical means of meeting the periodic winter peak loads. The paper also dealt with the advantages of methane plus blue water gas as an alternative to carburetted water gas.

The latest hopes of finding natural gas in this country are centred upon the boring at Fordon in East Yorkshire. This site is but ten miles distant from the seaport of Bridlington. Even if the possibility of yields from this borehole of gas quantities sufficient to change the pattern of gas utilization in Britain are discounted, it is clear that smaller volumes could be employed with advantage for peak load sharing or ancillary gasmaking. In such circumstances the transport of the gas in liquid form by coastal tankers, constructed on the lines detailed in the study, to London and other seaports would offer a flexible and economic alternative to the construction and operation of a series of pipelines.

In the discussion on the paper by Burns and Clark several speakers raised the question of the storage of liquid methane, and how this was being safely accomplished. The general conclusion come to was that the cause of the Cleveland disaster had been incorrect design of the particular storage tank, the incomplete knowledge of the behaviour of metals at low temperatures, and the failure to introduce and maintain efficient safety measures. These problems had been investigated and such an explosion should not occur again.

One speaker expressed surprise at the reference to methane alone. The natural gas evolved in the Middle East oil fields contained propane and butane among higher hydrocarbons, which were much easier and more suitable for the gas industry to make use of, so the speaker thought that these gases should first be considered when plans were being worked out for transporting liquefied gases from the Middle East to England, followed by methane if demand made it necessary.

Underground Gasification

THE underground gasification of coal came into the news again a few days ago when the Minister of Fuel and Power, Mr. Aubrey Jones, replying to a question asked by Mr. J. E. Ridsdale in the House of Commons, informed the House that the development of the technique of underground gasification had now reached the point at which the establishment of a pilot-scale plant was desirable. Mr. Jones continued: 'As from July 1, the National Coal Board and the Central Electricity Authority have, within their respective spheres, accepted responsibility for the planning and construction of this pilot plant and have undertaken to explore the possibilities of exploitation on a commercial scale. Details of the transition to these new arrangements are now under discussion between my Ministry and the two authorities. I have indicated to both of them the importance of developing with the utmost expedition this important new technique as well as my wish that private enterprise should be associated with this work particularly so that full advantage of its successful development can be taken in overseas markets.' Some time will elapse before the commercial possibilities of this project can be confirmed. Even when a successful pilot plant has been constructed it will inevitably be some years before full scale commercial plant can be brought into operation.

Underground gasification has reached the stage of being demonstrated on a small scale after six years' work by the Ministry of Fuel and Power in co-operation with the National Coal Board. The process holds promise of exploiting some of our coal resources with the minimum use of scarce mining manpower. In this respect it is comparable with opencast mining, with the additional advantage that the disturbance to the surface of the ground is much reduced.

A new and favourable factor is the use of 'directed drilling.' This is a technique for drilling holes some hundreds of feet long in a horizontal coal seam; it has been under development for some time for ordinary mining purposes. In application to underground gasification one procedure is to sink small shafts down to the coal seam and drive parallel galleries in the coal seam several hundred feet apart. Parallel holes are then drilled from one gallery to the other in the coal, about 30 ft. apart. Air is pumped down one of these shafts and emerges as gas at the other after reacting with burning coal in the boreholes. The gas which emerges has a calorific value of between 70 and 100 B.Th.U. per cu.ft., which is, of course, so weak as to be uneconomic to pipe it any distance.

Another method of using such boreholes is the 'blind borehole' technique in which the borehole is drilled to a blind end. Air for combustion is carried to the burn-

ing coal reaction at the far end by a steel tube in this borehole. A particular advantage is that the air passing along the tube is preheated by the gas passing back outside the tube which itself is cooled. The results of trials using this technique have been encouraging, and it seems probable this will be the method on which the next stage of development will be concentrated. In a large-scale system such blind boreholes could be drilled either radially into the coal from the bottom of a shaft or on each side of a gallery driven from a shaft.

Some tests in underground gasification were carried out in Great Britain by Sir William Ramsay over 40 years ago, but these were interrupted by the first world war. Russia started some 20 years later, and trials continue there, with probably some full-scale production. More recently trials have been carried out in Belgium, U.S.A., Italy, Poland and French Morocco. The United Kingdom were later in the field, and first made gas in 1950; in the last six years over 5,000 tons of coal have been gasified in 50 field tests in six coal seams on two different sites, and several techniques have been used. On the first site to be used at Newman Spinney, near Barlborough, on the Derbyshire/Yorkshire border, some tests are still in progress. At the other site at Bayton in Worcestershire, work has been discontinued. We shall watch progress of the new plant with interest.

South Eastern Prices Pegged

AT a time when the wage-price spiral is fast taking us into dangerous altitudes, it is likely that the country as a whole will applaud the action of the South Eastern Gas Board in pegging the price of gas and publicly stating its intention, barring accidents, of maintaining the present figures for the rest of the year.

Mr. W. K. Hutchison, Chairman of the Board, told members of the South-Eastern Gas Consultative Council that in view of the satisfactory revenue balance for the year ended last March the Board hoped to keep prices at their present level for the rest of the year. 'The coal increase we are now facing,' said Mr. Hutchison, 'is going to cost us 6s. 2d. a ton—over £1 mill. to the Board in a full year. General increases in salaries and wages negotiated in the early part of this year will cost something like £900,000 in a full year. Against this we have an increase in the price of coke which should yield us about £750,000.' They were reaping the benefits of the big developments of the past six years. The budget for the present year indicated a satisfactory surplus, but it would only be realized if prices of materials and the cost of labour remained at their present level.

Two weeks ago we were talking about the importance of good public relations for the gas industry. Actions speak louder than words and there is no better way of maintaining public faith in our fuel than by exhibiting a determination to consider and protect the consumer's pocket and the nation's economic stability.

In Parliament

Kisses for Russian Babies? ★ Modern Management Methods Wanted ★ No Let-out for Coal ★ Steps in the Right Direction ★ Expenses ★ What About Rural Gasification?

RECENTLY the Russian Minister of Power Stations came romping over to Britain, had a look at one or two power stations, asked to see a pub, kissed a few babies, and sailed off back to Russia in a curious golden cloud of popularity.

The idea seems to be catching on. The Minister of Fuel and Power is hoping to send some experts over to Russia to have a look at their remarkably efficient methods of underground gasification. But don't run away with the idea that he is persuaded that this will necessarily end further exploratory expenditure in this country. He is not.

Oh, well, if nothing else, it will make a nice break for the visiting experts—and they might get a chance of kissing a few Russian babies!

* * *

The gas industry—among other nationalised undertakings—is not taking full advantage of modern management methods, said Sir Keith Joseph recently, while talking of the Finance Bill.

And now that the Chancellor was pressing the fee into the piper's hand, continued Sir Keith, he hoped he would urge the piper to use work study and cost control. We couldn't agree more.

* * *

The Chancellor was asked the pertinent question, what was the purchasing power of the £ in terms of 20s. in 1945, each time the price of domestic coal has increased since nationalisation; how far inflation is due to higher prices; and how inflation can be ended if coal prices continue to rise.

Sir E. Boyle replied, in part, that at the time of the increase in the pithead price of coal in July, 1955, the purchasing power of the £ in terms of 20s. in 1945 was 12s. 11d.

He added that inflation could not be attributed to price increases in individual commodities and could be ended only by removing the unbalance between our resources and the demands made upon them.

If this is supposed to provide a let-out for coal, we are not convinced. Sir Keith, in his criticism of nationalised undertakings, said the coal industry was just beginning to use modern management methods. We hope he is right—and that the industry will begin to get results.

A healthy little indication of steps in the right direction was discernable the other day when, in reply to a question, the Minister of Fuel and Power said that industrialists were becoming increasingly aware of the economic advantage of proper insulation of their factories and that the Government was helping things along by restoring the investment allowance for such purposes. Pats on the back all round: The more factories effectively insulated, the less fuel swallowed up and fumes belched forth into the atmosphere in keeping the factory hands contented and warm.

* * *

That very private subject—expenses—was rudely dragged into the open last week by no less a person than Vice-Admiral Hughes-Hallett, who had the temerity to ask the Chancellor of the Exchequer how expenses allowances paid to members of the boards of nationalised industries are dealt with for Income Tax purposes. Our hearts bled for our area board friends, but it was all right—Mr. Macmillan was as smooth as cream. Expenses allowances paid to members of public boards engaged in trade, he said, are assessable to tax as income in the same way as expenses allowances paid to directors of companies. A deduction may be claimed in respect of expenses incurred wholly, exclusively and necessarily in the performance of the duties of the office.'

* * *

A good deal was said in the House not so long ago about rural electrification. Would that as much could be said about rural gasification.

Personal

MR. NORMAN HEAVISIDE, of Blackhill, Co. Durham, has been appointed Assistant Manager of the Fell coke works of the Consett Iron Co., Ltd. Mr. Heaviside, who has worked at the Fell coke works for nine years, succeeds Mr. R. C. E. Trewhitt who has been appointed Coke Oven Manager with the Cargo Fleet Iron and Steel Co., Ltd.

MR. A. S. H. DICKER, M.B.E., of Norwich, has been appointed part-time member of the Eastern Gas Board. The appointment will date from June 1, 1956. Mr. Dicker is a member of a firm of chartered accountants in Norwich. He is the President of the Institute of Chartered Accountants.

MR. H. C. EXELL, Controller of Supplies, North Thames Gas Board, gave a paper at Utrecht to the Dutch Institute of Purchasing Efficiency, on June 7, entitled, 'The Purchasing and Stores Organization of the North Thames Gas Board.'

MR. S. ARMITAGE, MR. H. E. CHANCELLOR, MR. T. H. JOHNSON, and MR. A. L. WEST have been been appointed Regional Sales Managers by Parkinson & Cowan Gas Meters.

ALDERMAN J. HOY, Chairman of the Northern Gas Consultative Council, has been elected Deputy-Mayor of Sunderland.

Obituary

MR. WILLIAM R. ARMSTRONG, Manager and Engineer of Coleraine, Co. Londonderry, municipal gasworks for the past ten years, died at his home in Coleraine on May 20, aged 40 years. Mr. Armstrong was one of the Ulster gas industry's best known and most enterprising younger personalities. Educated at the Royal Belfast Academical Institution and Queen's University, he held the higher certificate (manufacture) of the Institute of Gas Engineers. During the air raids on Belfast he was responsible for the maintenance of full production in the vertical retort house at the city gasworks. He was appointed Manager and Engineer in the Coleraine works in May, 1946, since when big extensions and improvements have been carried out under his direction. Until his illness two months ago, Mr. Armstrong, in conjunction with the Ministry of Commerce, who are defraying the cost, was engaged in carrying out an important experiment—the conversion of Coleraine plant for producing gas from oil instead of coal.

MR. WALTER EDWARD DRIVER, of Lime Tree Close, Huntingdon, for a number of years a Director of the former Huntingdon Gas Co., Ltd., has died at the age of 77. From 1937 to 1940 he was Mayor of Huntingdon. He was first elected to the Town Council 32 years ago and remained on the Council until he retired in February, 1954.

Correspondence

GUIDANCE WAS NOT NEEDED

DEAR SIR,

I feel that I must comment upon an incident connected with the presentation of the Scroll of Honorary Life Membership of the Institution of Gas Engineers to the Duke of Edinburgh.

Just before the Duke entered the Royal Festival Hall, a member of the Council, ostensibly on the platform for this purpose, announced that His Royal Highness was just entering the building, and then asked that those present should stand and thus be ready to show their respect and welcome upon his arrival.

In my opinion, which I think is generally held, there is no section of the British public which is not innately desirous and capable of showing respect and loyalty to members of the Royal Family, and I therefore humbly suggest that the Duke would have been much more delighted with the respect shown by the company present rising spontaneously to greet him as he entered the hall, than to find that they had been 'called to attention' like school children for that purpose.

I suggest that the action was unfortunate and I have heard a lot of criticism regarding it.

Yours truly,
'EX OFFICER.'

May 31, 1956.

A MISUNDERSTANDING

DEAR SIR,

Upon page 606 of the 'GAS JOURNAL,' May 30, is a report of my contribution to the discussion upon the 'Symposium on Coke' at the recent meeting of the Wales and Monmouthshire Section of the Institution of Gas Engineers. Although the report upon my contribution mentions that low volatile coal can be used to replace coke for steam raising, there is evidently a misunderstanding because it is our general practice to use various steam coals of up to about 14% volatile content for water gas production, not for steam raising. This practice has been developed quite successfully upon a large scale in various types of water gas plants.

Yours faithfully,
E. M. EDWARDS.

Wales Gas Board.
June 9, 1956.

Diary

June 14.—INCORPORATED PLANT ENGINEERS: Brains Trust, 'Fuel and the Future,' The Royal Institution, Colquitt Street, Liverpool, 7.15 p.m.

June 14.—MIDLAND JUNIORS: Ladies' Day. Visit to Derbyshire Silica Firebrick Co. Ltd., Friden.

June 14 and 15.—EASTERN SECTION, I.G.E.: Annual General Meeting. Chairman's Address. Paper, 'Gas in the Rural Areas,' J. T. Brookes, Great Yarmouth.

June 15.—WALES G.C.C.: Guildhall, Swansea. 11.0 a.m.

June 16. — MANCHESTER JUNIORS: Ladies' Day, Windermere.

June 16.—WESTERN JUNIORS: Summer Meeting and Ladies' Day, Dartmouth.

June 16.—SCOTTISH JUNIORS (EASTERN): Golf outing. Balwherrie, Kirkcaldy.

June 22.—LONDON JUNIORS: Summer Meeting and Ladies' Day. Visit to the Nine Elms Works of the North Thames Gas Board, and a river trip to the Pool of London.

Calendar & Directory Alterations

The following changes have been notified during the past month. To keep the information in the current 1956 edition of the Gas Journal Calendar and Directory up to date readers are invited to note these alterations in the Directory Section.

Page D41.—IPSWICH DIVISION: R. Whiting, *Divisional General Manager*, vice W. J. Collins Garrard, retired.

Page D79.—SOUTH EASTERN GAS BOARD: R. H. Sandford Smith, *Deputy Chairman;* R. G. Huxtable, *Secretary.*

Page D93.—SOUTHERN GAS BOARD: H. M. Lawrence, *Materials Handling, Transport and Coal Manager.*

Page D107.—WEST MIDLANDS GAS BOARD: Delete H. R. Hems, *Industrial Gas Officer,* retired.

Page D149.—INSTITUTION OF GAS ENGINEERS: Sir Henry F. H. Jones, *President;* E. M. Edwards, *Vice-President;* G. E. Currier, *Hon. Secretary;* Sir Harold C. Smith, and Mr. P. D. Davey, *Auditors. Ordinary Members of Council:* T. C. Battersby, A. R. Bennett, L. P. Ingram, J. Powdrill.

Page D153.—MANCHESTER AND DISTRICT SECTION: J. M. McLusky, *Chairman;* R. L. Greaves, *Senior Vice-Chairman;* J. G. Tilley, *Junior Vice-Chairman.*

Page D154.—MIDLAND SECTION: J. Corrigan, *Chairman;* F. L. Atkin, *Senior Vice-Chairman;* F. H. Bate, *Junior Vice-Chairman.*

Page D155. NORTH OF ENGLAND SECTION: J. R. Cleator, *Chairman;* J. E. White, *Senior Vice-Chairman;* F. J. Webster, *Junior Vice-Chairman;* J. R. Matthew, *Hon. Secretary.*

Page D161.—EASTERN JUNIORS: E. S. Dennis, *President;* J. L. Ireland, *Senior Vice-President;* W. F. Pritchard, *Junior Vice-President.*

Page D162.—WESTERN JUNIORS: J. B. Taylor, *President;* K. G. Pemberton, *Senior Vice-President;* W. E. Baggs, *Junior Vice-President.*

Page D167.—B.G.S.A.: Sir Graham Cunningham, *President;* F. P. S. Stammers, *Chairman;* L. J. Walker, *Vice-Chairman.*

Rising Costs Worry the Gas Industry

Methods Sought to Ease Burden on Coal

N.G.C.C. TOLD OF DEVELOPMENTS IN NORTH EAST

CONCERN over rising costs of production was such that the gas industry was investigating every method that might take some of the burden from the coal industry, Mr. E. Crowther, Chairman of the Northern Gas Board, told members of the Northern Gas Consultative Council in Newcastle last week.

He forecast that within 12 months a plant at Carlisle would be producing 1 mill. cu.ft. of gas per day from heavy oil. He said it was decided some time ago to concentrate on the new method of production at Carlisle rather than spend more money in extending coal carbonization plant.

Price the Same

The price per therm would probably be about the same but it was hoped that it would be more stable than the price of gas dependent on coal. The possibility of an oil plant at Darlington had also been investigated, but the Board had to consider its coke market, particularly in view of the spread of smokeless zones in the North-East.

The North-East was placed at some disadvantage in the production of gas from oil. Unlike some other regions no big refinery was close at hand.

He understood that there was a chance of getting gas in liquefied form from oil wells in several parts of the world. 'A great deal of time and effort is going into this question of research in a great many fields and I hope we will strike a winner before very long,' he said.

Mr. Crowther stated that representatives of the Board were to meet the National Coal Board soon to enquire into the possibility of bringing more gas from the mines. At present a supply was available from one pit in Northumberland and this might be joined by many more.

The Council passed a resolution urging that the Government should meet N.C.B. losses on imported coal. 'We call for direct action by the Government and we think that public opinion should be mobilized, calling as a first step to assist the Board to fight these increased costs,' the resolution said. 'The Government should repay losses sustained by the N.C.B. on imported coal which amounted to £29 mill. last year.'

Alderman Joseph Hoy, Chairman of the Council, referred to the action of the Northern Gas Board in publicizing the new increase of 2d. a therm to gas consumers before the Consultative Council had the chance to discuss it.

Mr. Crowther said that the announcement was made early to leave no doubt in the public mind that the increase followed the rise in the price of coal. Besides, he explained, the sooner measures were publicized the sooner their effects would benefit the industry. Altogether the Board had to face a deficit of £990,000 through wage, freight, and coal increases.

Against this could be set improved coke sales of about £110,000 and the rest would be made up by economies and the income from consumers. The increases would produce about £625,000 this year and after that the Board could look forward to a small surplus which was needed to set against rising costs.

'We only hope that the Chancellor is right in saying that we have reached a period of stability,' added Mr. Crowther.

West Midlands Gas to Go Up?

A warning that the price of gas will have to be advanced in the West Midlands was given at a meeting of the West Midlands Gas Consultative Council in Birmingham last week under the chairmanship of Alderman J. H. Lewis.

Mr. G. le B. Diamond, Chairman of the West Midlands Gas Board, said that approximately £1 mill. had been added to the Board's annual coal bill.

Productivity of steam raising plant had been raised during the past year, through study and training, by £150,000. There had also been a saving due to the transferring the conveyance of coal from rail to road. Even so, gas prices would have to be increased from September.

N.G.B. GAS PRICES GO UP FOLLOWING RAISED COAL COST

FOLLOWING the latest increase in coal prices, the Northern Gas Board has decided to raise its gas charges. The increase ranges up to a maximum of 2d. a therm, and the new rates are 1s. 9½d. a therm in industrial areas, 2s. 0½d. in outlying areas, and 2s. 3½d. in rural areas.

The higher coal charges are expected to cost the Board about £300,000 annually. The Board, however, has decided to drop the 5s. service charge introduced some weeks ago.

This service charge was made in an attempt to hold gas prices at their old rates; the decision to discontinue it is the result of prices having to be raised following the higher coal costs.

NORTH THAMES GAS UP 2d.
BUT PRICE PEGGED IF . . .

NORTH Thames gas is to cost 2d. a therm more after August 1 of this year. All other rates will be increased 'in the same proportion.'

Making the announcement, Mr. Michael Milne-Watson told the area Consultative Council: 'No one can say what further increases in cost the next year or two have in store, we can but hope that the Government's intentions to stabilize the economy will have their effect. Assuming this, and that we do not have any major increases in the cost of labour or raw materials, it is the Board's firm intention to peg the price of gas at least until the end of 1958 or the beginning of 1959.'

Summarizing increased annual costs which the Board are having to meet, Mr. Milne-Watson included wages and salaries (£1,115,000 more from February 1); railway freights (£200 000 more from April 23); supplementary pensions (£85,000 more from April 1); and repairs and maintenance (£207,000 more from October last year). The total was £1,607,000 per year more.

Against this could be set a small increase in the price of coke and breeze which took effect in April and in a full year should bring in about £198,000. The situation at the end of April was, therefore, that the Board were faced with a net annual increase in cost of £1,409,000.

He went on: 'But now another blow, no less heavy, has fallen. From June 1 the Board are having to pay 6s. more per ton of coal, or in a full year £1,478,000.

'The increase of 9s. a ton with effect from June 1 in the price of coke, and coupled with an increase of 4s. 6d. in the price of breeze, should produce, in a full year, £893,000.

'The Board's increased liabilities could, therefore, be stated as £1,994,000 per annum. In arriving at this final figure we have, I may say, taken no account of the increased wages and cost of coal in industry generally that may mean higher charges to the Board for work done and materials supplied.' he said.

'You will see, therefore, that the annual cost of the Board's operations, for reasons over which we have no control, is now running at a figure likely to be at least £2 mill. more than it was something under a year ago.

'It is small comfort to reflect that our improvements in technical efficiency and administration would have meant cheaper gas to the consumer if only the seven years from vesting day had been a time of stable prices and wages. Lamentably, our experience is the reverse.'

A PERIOD OF 'INTENSE ACTIVITY'

N.A.L.G.O. Delegates Told of Past Year's Achievement

MORE than 1,500 delegates representing nearly a quarter of a million members, attended the annual conference of the National and Local Government Officers' Association in Edinburgh, last week.

Mr. George Phillips, the Association's Organizing Officer for gas staffs, addressing members of the gas industry, described the previous year as 'a period of intense activity,' during which, in addition to the cost of living increases that had been obtained, a number of long outstanding problems had been resolved. These included a review of the salaries agreement of the National Joint Council for Gas Staffs; the introduction of equal pay for equal work; national agreements on subsistence allowances and the expenses of compulsorily transferred officers; and the adoption of a national salaries table for senior gas officers.

Another question which had, and was still receiving most careful attention, was the efficiency of the industry, and the introduction of schemes of reorganization, mechanization, and automation.

In his opening address, the President of N.A.L.G.O., Mr. P. H. Harrold, O.B.E., Town Clerk of Hampstead, said that the restoration of 1946 standards remained their goal.

It was a common delusion to think of the public services as 'unproductive.' The services N.A.L.G.O. represented were the most truly productive in Britain today and their output in the past ten years had been without parallel in any of the industries more commonly regarded as productive.

Since 1946, local government had built more than 1.8 mill. homes, new schools for more than a million children as well as enlarging existing schools to take another 700,000, and helped to create a National Health Service which was the envy of the civilized world.

Even more important was the greater happiness brought to deprived children and to the sick, the aged, and the handicapped; the positive health and protection from disease; the opportunities for further education and the full enjoyment of leisure; and the restoration of the sick and injured.

Allowed to Fall

Since it was members of N.A.L.G.O., very largely, who ran those essential and productive services, they had more than justified 1946 standards. Yet what had happened? Employers, who had agreed those standards, had since allowed them to fall. Not only was there a serious fall, but an even more serious shrinkage of the differentials between the highly skilled or trained professional and technical man and the unqualified employee.

Insufficient had been done to halt the drift from the service for higher rewards elsewhere; the failure to recruit juniors of the necessary calibre; headmasters advising their best pupils to avoid the public service because they no longer offered a satisfactory career; an alarming turnover of employees; and staff shortages and growing pressure of work.

Incomes had risen far less than total output, the price of which, according to the Government, had increased since 1946 by about 50%. Until that leeway had been made up it could not be said that their claims were inflationary. Moreover, the Government, on the recommendation of a Royal Commission, had increased the salaries of its own servants to a much greater extent than had their employers increased theirs.

Pensions Increase Bill

If the past, Golden Jubilee, year had not brought the hoped-for birthday gift of adequate salaries, it had brought benefits in other directions. One was the introduction by the Government of the Pensions Increase Bill. Another had been the unbroken series of important legal victories over some local authorities which had sought to evade the nationally-agreed doctrine of collective bargaining through representative institutions of employers and employed. Of greater importance had been the realization of that major goal of policy, equal pay for equal work.

Workmates Meet —After 34 Years

FOUR gasworks men who had shared the same job for 34 years but had never met have just held a 're-union'—and planned another in 10 years' time!

The four men all started work in the exhauster house of the Doncaster gasworks within a few months of each other 34 years ago: they were good friends although they were never off duty together.

Three of them, James Atkin, of Essex Avenue; Edward Sheehan, of Barnston Street; and James Whitehead, of St. Ursula's Road, Doncaster, have now retired.

It was when the fourth member of the quartette, John Hobson, of Hawke Road, Doncaster, heard that one of the others was moving to Cambridge that he decided something should be done about a get-together before it was too late.

'MAJOR REORGANIZATION' OF SOME SCOTTISH WORKS

A MAJOR reorganization in gas distribution in Renfrewshire and rural parts of Ayrshire will involve the closing down of a number of gasworks which have been in production for over 100 years, it was disclosed last week, by Mr. Alexander Jamieson, Group Manager of the Scottish Gas Board (Western Area).

The gasworks at Gourock, which have been producing over 100 mill. cu.ft. of gas per year, and at Renfrew (180 mill. cu.ft. per year) have been closed. Gas supplies for domestic use and industry are now being piped from the gasworks at Greenock, which has increased its daily output to meet extra demands.

Mr. Jamieson said a general rise in costs had compelled the Board to make economies, and several gasworks had been closed down. It was hoped to make 'quite a large saving' as a result. He said several economies were effected some time ago, but these had been swallowed up by continued rising costs.

Among the smaller gasworks to be closed were those at Kilmacolm, Bridge of Weir, Kilbarchan, Lochwinnoch, in Renfrewshire, and Beith, Kilbirnie, Dalry and Kilwinning, in Ayrshire.

Engineers have completed the laying of a 13½ mile long pipeline, 12. in. in diameter, to carry gas supplies from Greenock to Linwood, where the supply is fed into Paisley through existing installation.

U.K. Firm Secures £11 Mill. Contract from Canada

THE South Durham Steel and Iron Co., Ltd., Stockton-on-Tees, have received a contract stated to be worth £11,400,000, for the supply of 636 miles of 30-in. diameter gas main for a gas pipeline between Winnipeg and North Bay, Eastern Ontario, for the trans-Canada Pipeline Company.

Deliveries of the main will begin next April and will be completed in July, 1959. Last year, the Stockton firm obtained a contract worth about £5,000,000 for supplying pipeline for the western portion of the new cross-Canada gas main.

Recently opened, the new sales and service centre of the North Eastern Gas Board, Wakefield District, in Union Street, Wakefield, opposite the bus station, has on view all the latest types of gas appliances.

This new and modern centre replaces premises at Margate.

International Gas Union Rome Meeting

EXPERTS OF 11 NATIONS DISCUSS PROBLEMS

THE Council of the International Gas Union met recently in Rome, under the chairmanship of Prof. Dott. Ing. Mario Boselli, President of the International Gas Union.

Delegates of the national organizations of Austria, Belgium, Denmark, France, Germany, Great Britain, Italy, the Netherlands, Spain, Sweden, and Switzerland were present, as well as Mr. A. Baril and Mr. M. Brabant, Honorary Presidents, and Mr. P. Mougin and Col. H. Zollikofer, Honorary General Secretaries.

The work done by the four international committees of the Union was discussed. The Committee for the harmonization of essential clauses in the specifications for stamping of gas appliances has begun the examination of the conditions required for burners using various gases; the Committee for the development of gas utilization was entrusted by the Council with a special study of co-operation with architects, builders, and fitters with a view to increasing the efficiency of Home Service.

Vocabulary Committee

The Vocabulary Committee is carrying on its work normally with the help of Unesco, while the Committee on Statistics has completed the first part of the task it had undertaken thanks to the collaboration of a prominent specialist delegated by the Economic Commission for Europe, with which conversely, the Union co-operates in the exchange of technical information. The Chairman of this Committee was called upon to sit as an expert on the working party on statistics of the Gas Committee of the Organization for European Economic Co-operation.

Two new Committees were created, one to study new distribution techniques and the other to study the interchangeability of gases.

The Council is greatly interested in the problem of the exchange of engineers from different countries and entrusted three of its members with the re-examination of this question.

ANNUAL BOWLS MATCH

EDINBURG Division of the Scottish Gas Board defeated the Scottish Association of Gas Managers' Bowling Club by 98 shots against 68 in their annual match at Granton recently. After the match Mr. Rutherforth, of Dalkeith, on behalf of the S.A.G.M. Bowling Club, said how much they enjoyed visiting Granton. Mr. J. Penman, President of the Edinburgh Division, expressed thanks on behalf of his Club.

'TRY THE GAS INDUSTRY' YOUNGSMAN

The North Eastern Gas Board stand at the recent Careers' Exhibition staged by the Bradford Youth Employment Committee. Demonstrations were given by an apprentice fitter and a trainee chemist.

Edinburgh Plans for Improved Gas Service

ADMINISTRATIVE developments which should lead to further improvement in the Scottish Gas Board's service in Edinburgh are planned as part of an office reorganization at the Board's premises at 25, Waterloo Place. One of the developments concerns the Board's central progress bureau, which directs the work, notably on repair and maintenance, done by several hundred employees throughout the city.

Such improvements have been made possible by termination of the lease of part of the property at 25 Waterloo Place, in which the tenant until now has been the office of the Collector of Customs and Excise. It was announced two months ago that the Scottish Gas Board were to spend some £14,000 on improvements at 25, Waterloo Place, a move which would help to relieve overcrowding in their Calton Hill offices.

Medical Adviser's Office

Under the reorganization scheme, the ground floor at the Waterloo Place property will become a service centre, where the public will be able to pay their gas accounts. There will also be accommodation for a Board medical adviser.

In the autumn of this year new work will devolve upon the Scottish Gas Board, because from then the office of Edinburgh Corporation City Collector will no longer act as a 'debt-collecting agency' for the Board. The City Collector's office will continue to act as a centre at which the public can pay their accounts, but they will not undertake related work, such as sending out final notices following non-payment of bills.

NEW SHOWROOM OPENED IN CARDENDEN

Mr. Sidney Smith, Chairman of the Scottish Gas Board, opened the new gas service centre and showroom at Cardenden, Fife, recently, making his first public appearance since his recent appointment. He said the centre was an example of the Board's policy to emphasize service to the consumer. The aim was to provide the best possible service at the cheapest price.

In mining areas, with concessionary coal available, gas consumption was not as high as it might be, but nowadays miners' wives were more than ever appreciating the modern appliances, particularly cookers and washing machines.

Sir Robert Nimmo, Chairman of the Scottish Gas Consultative Council, and Mr. John Sneddon, Fife County Convener, Kelty, were also present at the ceremony.

60% OF DOMESTIC APPLIANCES TESTED REQUIRED ATTENTION

N.T.G.C.C. Told of Home Safety Drive

OF some 12,000 domestic gas installations inspected, nearly 60% required attention, it was revealed at a meeting of the North Thames Gas Consultative Council, held at the works of the Osram-General Electric Co., Ltd., recently. Councillor Edwin Bayliss, Chairman, presided.

Before the meeting, members of the Council were shown over the Osram lamp works. The G.E.C. is the North Thames Gas Board's largest consumer of industrial gas.

It was reported that the Minister of Fuel and Power had appointed Councillor Mrs. G. I. Wilson (Finchley) to be a member of the Council until May, 1958.

It was also reported that Alderman H. D. Cowan (Ilford), and Mr. T. A. Mason (A. Boake Roberts and Co., Ltd.), had resigned. The Minister was taking steps to fill the vacancy caused by Mr. Mason's resignation.

The Council appointed the following as members of the Council's District Committees for the year ending May 31, 1957:—*Middlesex and Surrey District Committee*—Councillor E. W. J. Everett (Mayor of Acton), Councillor K. P. Payne (West Byfleet, Chertsey, Surrey). *Essex District Committee*—Councillor H. F. Moss (Hornchurch), Alderman G. Roberts, (Romford).

Smokeless Fuel for Scotland

N.C.B. Official Denies Lack of Interest

DENYING a charge by Mr. John Innes, Chairman of the Scottish Division of the Smoke Abatement Society, that little or nothing was being done by the National Coal Board to provide smokeless fuel for Scotland, Mr. R. W. Parker, Chairman of the Scottish Division of the N.C.B., said that experiments in producing smokeless fuel from bituminous coal were going on in England and that there would be no virtue in duplicating them in Scotland.

He was speaking at a recent one-day conference in Glasgow organized by the Scottish Committee of the Coal Utilization Council.

Mr. Parker added that coke was not the popular fuel in Scotland it might be: Domestic consumption of gas coke was about 125,000 tons a year. Scotland consumed only about 11,000 tons of coke oven coal, which proportionately was very much less than England.

LET THE INSPECTOR IN, OLD FOLKS URGED

OLD people were urged by the Halifax Coroner, Mr. B. W. Little, to take full advantage of the system of periodical inspection of gas fittings by the North Eastern Gas Board.

Fred Varley, a Gas Board distribution foreman, had told the Coroner that the system of examining fittings was in operation but that difficulty was experienced in getting into the homes of some old people as they said their fittings were all right.

COMPANY REPORTS

Coalite and Chemical Products Ltd.

THE trading surplus of Coalite and Chemical Products Ltd., after depreciation, amounts to £563,158 for the year ended March 31, 1956, compared with the previous year's surplus of £502,536. Final dividend proposed on ordinary stock is 9%, less income tax, making with the interim dividend already paid a total of 12% (11% last year).

The net profits of the Group for the year amounted to £293,336 (£238,650), after charging taxation £269,822 (£263,886), depreciation £154,167 (£128,663).

Imperial Continental Gas Association

PROFIT for the year ended March 31, 1956, of Imperial Continental Gas Association, amounted to £1,045,949 after all charges except taxation (against £875,851 last time). U.K. taxation took £559,874 (445,691). Interim dividend of 4% less tax amounted to £128,800 (4% less tax, £123,200); proposed final is 11%, £354,200 (9%, £289,800), making a total of 15%, £483,000 (13%, £413,200 and special dividend of 1%, £32,200, making a total of 14%, £445,200). £155,965 is carried forward (against £152,890 brought forward from previous year).

FIRM SLASHES FLUORESCENT LAMP PRICE

THE price of Mazda, Royal 'Edi-swan,' and Metrovick 8 ft., 125-watt fluorescent lamps has been reduced from 32s. 6d. to 25s., the A.E.I. Lamp and Lighting Co. announces.

In the past this lamp has only been used where conditions of service demanded it; at the new price it takes its rightful place in the range of fluorescent lamps, says the company.

The immediate importance of the 23% reduction in price will be appreciated for industrial lighting schemes, for commercial premises having large office accommodation, and for showrooms.

RECORD ENTRY FOR DUBLIN GAS CO. COOKERY CONTEST

DISTRIBUTING prizes and certificates awarded by the Alliance and Dublin Consumers Gas Co. in connection with its annual schools cookery competition, Mr. N. J. Robertson, General Manager, said there were 6,566 competitors—nine more than last year—and the number of prizes were 1,269, a record number for any year since these competitions were started 25 years ago.

Mr. Robertson said the continued high standard of the cookery shown was a source of great satisfaction to the gas company, and it was felt that by holding these tests their firm had contributed in no small way to this fine position.

Mr. Robertson submitted that there was no equal to cooking by gas. It was the best and most economical method of water heating, refrigeration, and space heating.

Firms Move to New Address

British Carbo Norit Union, Ltd., announce the transfer of their registered office from 176, Blackfriars Road, London, S.E.1, to new offices at London Road, West Thurrock, Grays, Essex, where correspondence regarding Ultrasorb activated carbon should be directed. Under the terms of a recent agreement, Whessoe, Ltd., will in future be responsible for the supply of Carbo-Union-Whessoe recovery plant for which enquiries should be addressed to Whessoe, Ltd., Darlington, Co. Durham, or 25, Victoria Street, London, S.W.1.

Phone Number Changed

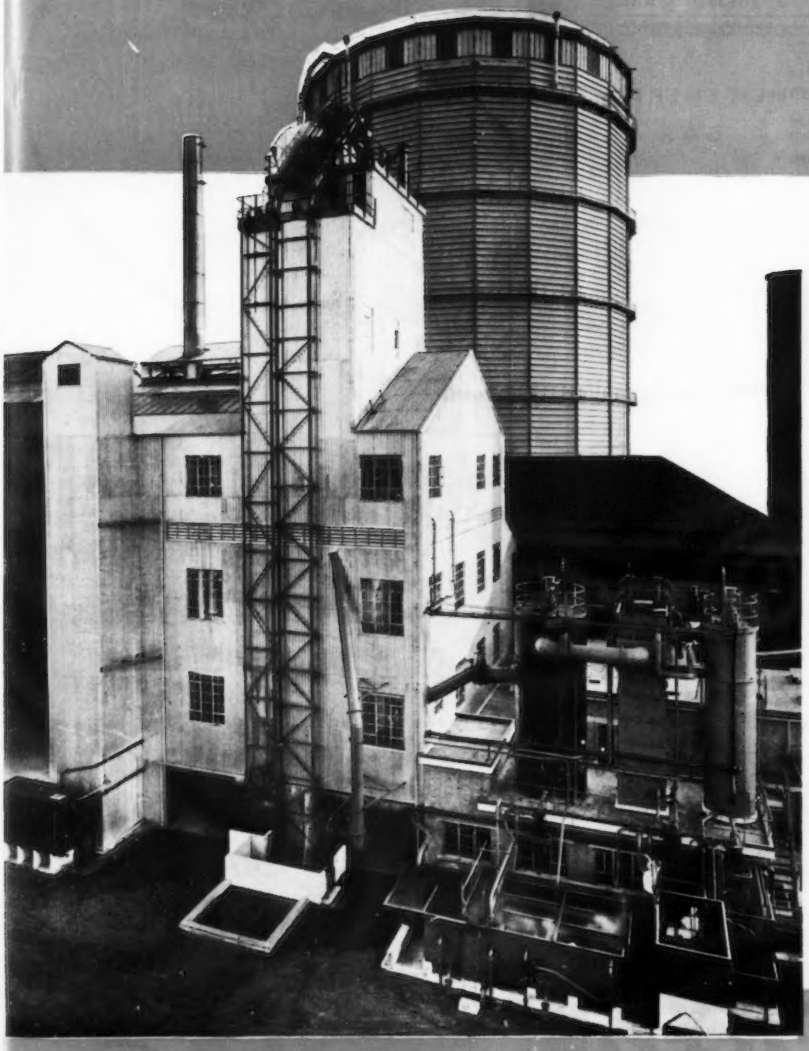
The telephone number for Pegson, Ltd., Coalville, has been changed from Coalville 234 to Coalville 1234 (10 lines).

NOW AT WORK

At the Kensal Green Works of the North Thames Gas Board.

The W-D/I.F.E. Complete Gasification Plant (G.I. System).

This plant produces more than 2½ mill. cu. ft. of 500 B.Th.U. gas per day from East Midlands low rank coal with a swelling number of 1 to 2 and containing approximately 37.5% of volatile matter.



W-D

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CONSTRUCTION COMPANY LIMITED

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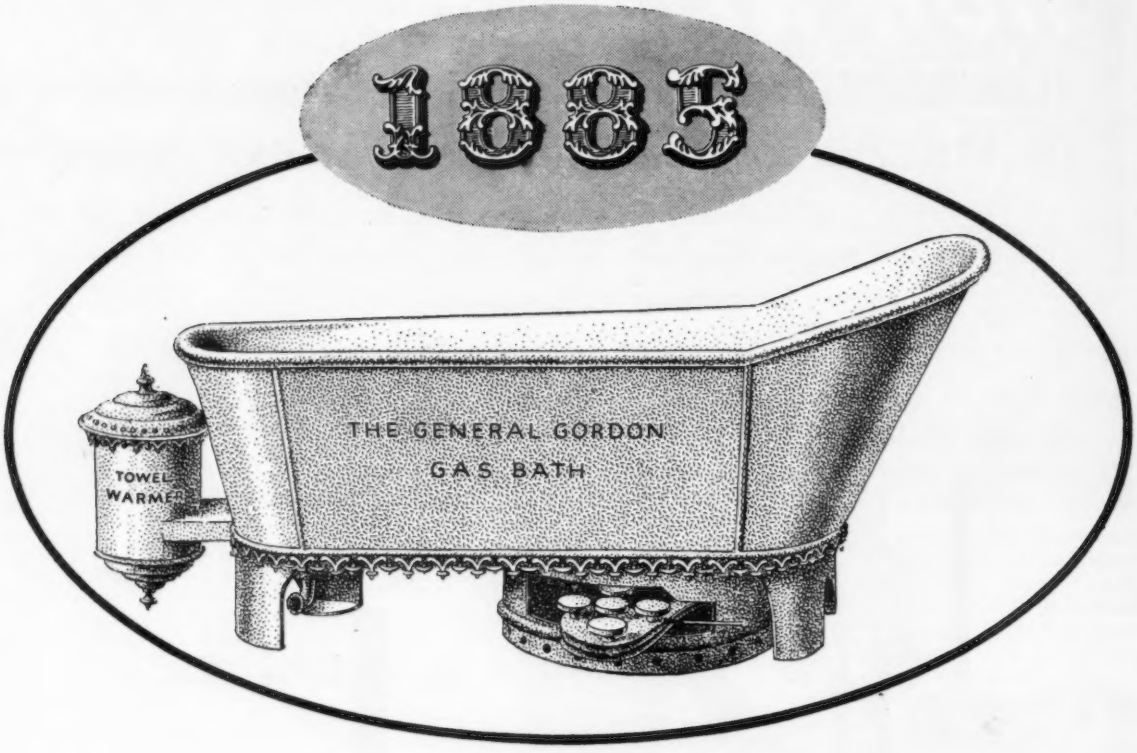
THE PROGRESS OF GAS



IT WAS NOT UNTIL THE '80S—when the rivalry of electric light made itself felt—that the gas companies turned seriously to the fields of heat and power, domestic and industrial.

Progress, however, was rapid, for much pioneering work had been done in the previous 30 years. Efficient gas heating had quickly followed the appearance of Bunsen's burner in 1855 and, twelve years later, a gas engine had been invented.

To such early experimental achievements as these—and many others such as the General Gordon Gas Bath, which dates from the 1850s—must go much of the credit for the speed with which later appliances made their appearance.

By the last ten years of the century, domestic cookers, fires and water heaters (or 'geysers') were being used on an ever-increasing scale, while furnaces, boilers and other plant using gas for heating were already helping to shape modern industry.

Issued by Imperial Chemical Industries Limited for the interest of the gas Industry—an important user of

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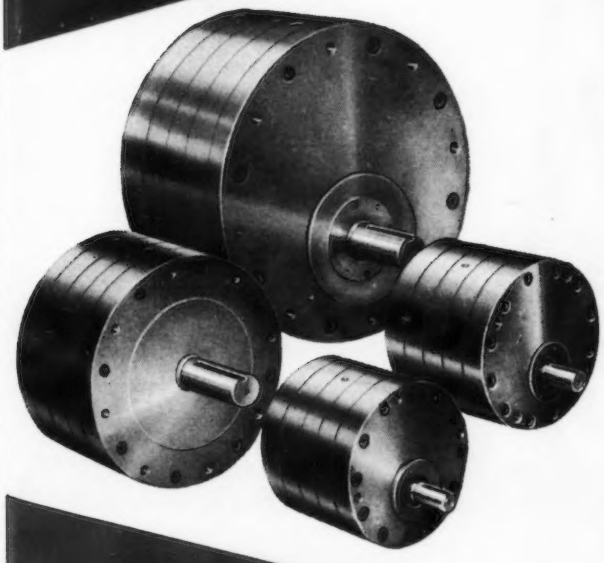

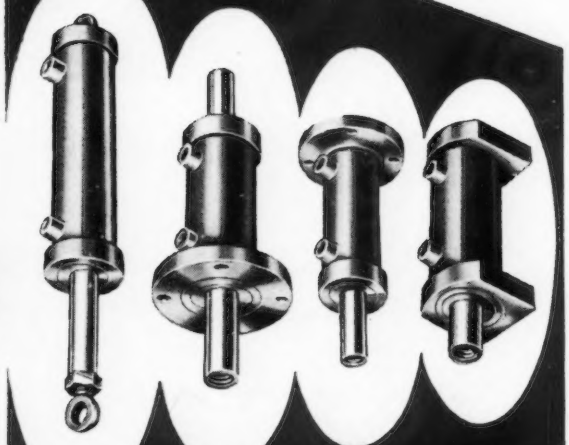

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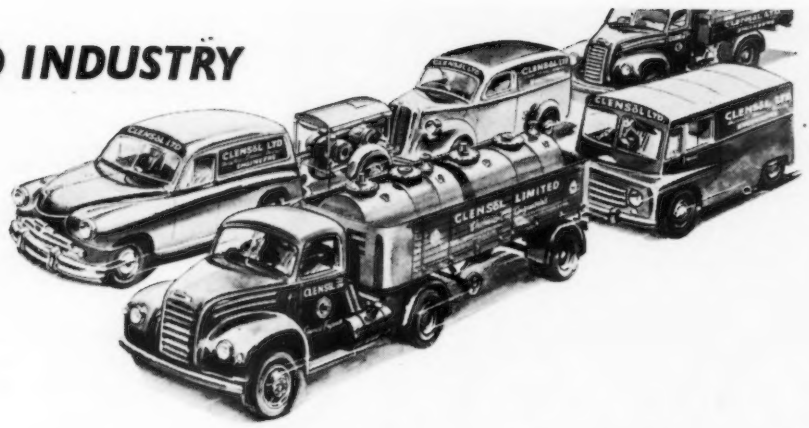

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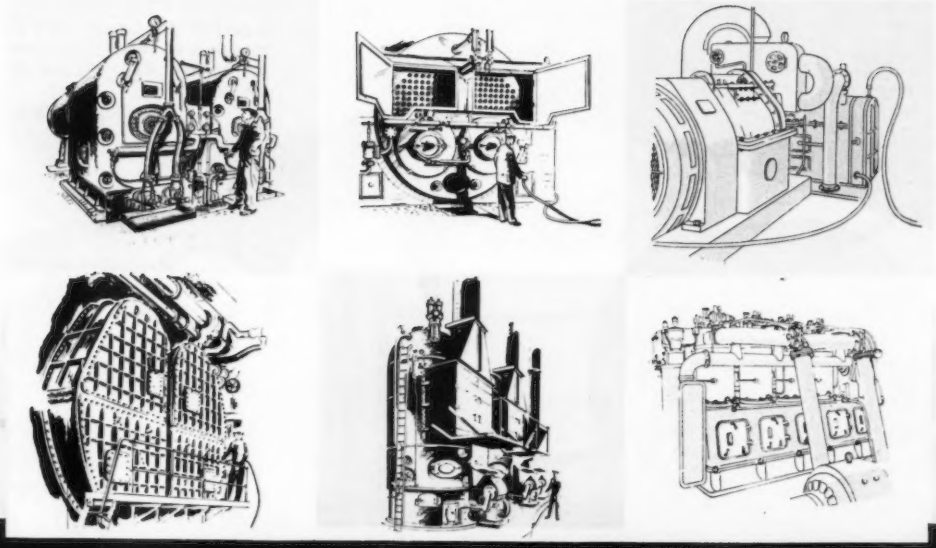

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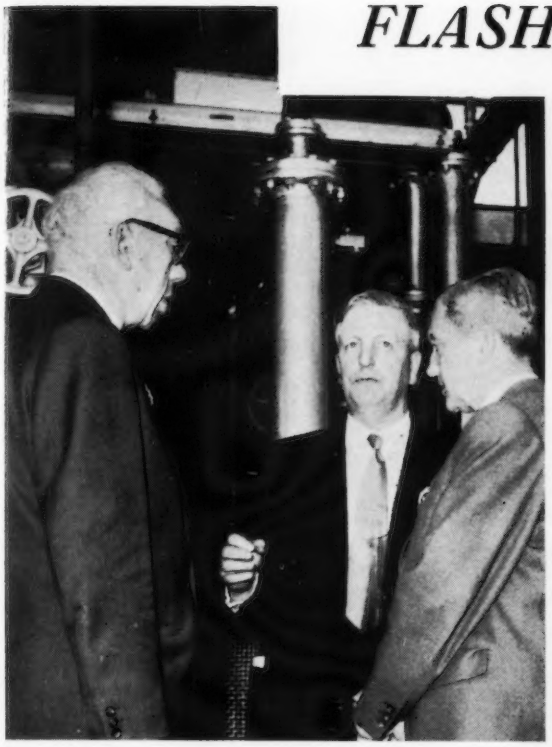
FLASHBACK—

to Institution Week

FOR almost the whole of Institution week the camera's flash and click were incessant. Many of the resultant pictures were presented in our Institution Number last week, but here is a selection from those taken on the visits. On two following pages are some 'embarkation' shots taken by our staff photographer.



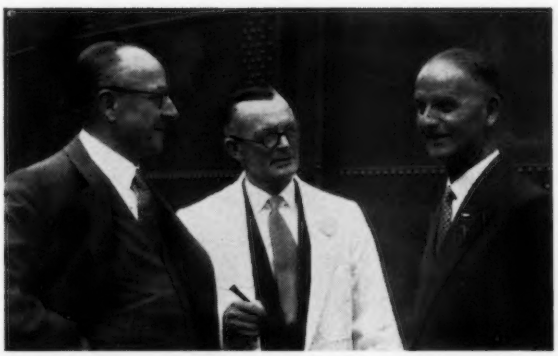
Above: *At Kensal Green. Dr. J. Burns (centre), Chief Engineer of the North Thames Gas Board, is shown with two German visitors, Dr. Traenckler and Herr Just, looking over the complete gasification plant.*

Top right: *At East Greenwich. From right to left, Mr. R. Prince, Chief Engineer, S.E.G.B., Mr. B. C. Hinwood, Station Engineer, East Greenwich, Mr. T. W. Gibson, Divisional Engineer, Metropolitan Division, Dr. Burns, Mr. W. K. Hutchison, Chairman, S.E.G.B., and Mr. R. M. Farror, Assistant Engineer, S.E.G.B.*

Centre right: *At Crawley. Mr. C. T. Price (left), Divisional Engineer, East Surrey Division, S.E.G.B., chats with Mr. C. P. Brown, Divisional Distributing Engineer, East Surrey Division, and Mr. M. Schenker, President of the Swiss Gas Association.*

Bottom right: *Gothic Works (Main Water Heaters, Ltd.), Croydon. Witnessing the torch brazing of flue spigots are, left to right: Mr. E. G. Smith, Glasgow; Mr. J. S. Smith, Ministry of Fuel and Power; Mrs. D. D. Burns; Mr. D. Duncan Melvin, Scottish Gas Board; and Mr. R. A. Carter, R. and A. Main, Ltd.*

Below: *Still at the Gothic Works, this time in the hot tinning shop. Right to left: Mr. M. W. Burt, Director and Secretary, S.B.G.I.; Mr. P. D. M. Aird, Deputy Chairman, Glover and Main, Ltd.; Mr. A. G. Higgins, Assistant Secretary, I.G.E.; and Lieut.-Colonel R. A. R. Fanshawe, Sales Manager, Main Refrigeration, Ltd. Also included in the picture are Mr. A. McDonald, North Eastern Gas Board; Mrs. P. D. M. Aird; Dame Vera Laughton Mathews, Gas Council.*



BY RIVER

It's Always Business —But With Pleasure . . .

WITH such wonderfully sunny days (most of the time) for the Institution's A.G.M., it was indeed fortunate that, as usual, so many interesting and well-conceived visits had been planned.

Luckiest of all were those who had elected to see the East Greenwich Works of the South Eastern Gas Board, some of whom are pictured on this page, for they went by motor launch on May 30 and 31 and could really enjoy the weather. Embarking in the morning, the visitors had lunch aboard and after the tour were entertained to tea by the South Eastern Gas Board. Members had the choice of two tours: Tour 'A' included most of the general plant; Tour 'B' included the new sulphuric acid plant (the first of its type in the country, which uses the Kachkaroff process) and the sulphate of ammonia plant with its functionally designed store in prestressed concrete.

BY ROAD

. . . When the Institution Goes Visiting

APART from the pleasure visits, coaches took members to:—

The East Surrey Distribution System of the South Eastern Gas Board and to Crawley New Town;

The Gothic Works, Croydon, of Main Water Heaters, Ltd.;

The Mitcham works of Mullard, Ltd.;

The Century Works, Lewisham, of Elliott Brothers (London), Ltd.; and the

Kensal Green works of the North Thames Gas Board.

Photographs on this page were taken while passengers embarked at the Royal Festival Hall. Pictures on both pages are by staff photographer Stephen Tennant.

Gas in France

Gas Space Heating

M PAUL GUENETON, Toulon, describes an interesting gas space-heating installation in a flat in that city. The flat consists of a living room, two bedrooms, kitchen and bathroom (salle d'eau). In an alcove projecting into the living room, with a grille facing into the room, is a gas-fired air heater. 'The essential characteristic of the system is the circulating of air by simple "thermo-siphon" thanks to the disposition of the air-heater, which is itself insulated,' from which the hot air is conducted by vertical conduits over the top of the rooms to be heated. The air, as cooled, returns to the heater through grills arranged in the floor and the doors. Insulated flues lead to the ceilings of the two bedrooms, the bathroom and straight out to the living room. The whole system is controlled by valves, thermostat and 'aerostat.' The consumer declares himself well satisfied with this heating by gas, the cost of which compares favourably with coal-heating in the other flats of the same block. The number of 'heating days' over the year was 130; the mean external temperature was 10.57°C. and the internal about 20°C.; and this was achieved with a mean daily gas consumption of 9.2 m^3 (say, 325 cu.ft.). No c.v. is given but it is probably 4,500 cal/m^3 (say 470 B.Th.U. per cu.ft.).

Determination of Gas Demand

M F. FERRIEU, Consulting Engineer, Gaz de France, contributes a long and detailed statistical study of the relation between gas sent out and atmospheric temperature in Paris and in its environs. He sets out a number of graphs covering the last few years and from these he deduces formulæ, more complicated than will be enjoyed by any but statisticians, which connect the two variables. He differentiates between industrial and space-heating loads and (if we do not simplify too much) he finds that the former follow a constant pattern while the latter follow two patterns, both dependent on temperature conditions, one for the summer period, another for the winter. The precise dates of the beginning and end of the winter period (which perhaps corresponds to the English term, the 'heating season') depend naturally on the observed outside temperature, but it is claimed that these can be fairly accurately determined. It is shown that when the necessary data are obtained and examined—and we suppose this will be different and characteristic for any given district—laws can be deduced from which the gas demand can be calculated beforehand for the observed average daily temperature. The pattern of the daily variation over the week is fairly constant and this is superimposed upon the seasonal graphs, and allowances are made for such special days as Saturday and Sunday (which are found to demand 10% and 25% respectively less than other days of the week) and holidays. Generally, it is found that the 'law of variation of global demand as a function of temperature was very sensibly linear.' The actual figures are not of general application but the method appears to be so.

Automation

OUR French colleague has no great admiration of the new word. 'Today there is talk of nothing but "automation," it is the fashionable word, all the rage from one side of the Atlantic to the other. American journalists who, a little blindly, have launched it into space, have certainly not asked themselves whether this new "vocable" corresponds to a real need or whether, in particular, it characterizes a notion different from that implied in the term, already old, "automatism."' The Committee of Studies of French Technical Terms, presided over by M. Combet, Director-General of Gaz de France, and which examines closely the credentials of foreign words which, by one door or another, seek to enter our (French) language, could not remain indifferent to the new visitor. 'Is it really necessary?' In the April issue, there is a witty yet philosophical article 'Comments on Automization,' by M. Pierre Agron which, to be appreciated, must be read in full and in the original. We permit ourselves one (not so irrelevant as it may seem) quotation: 'The use of antibiotics has happily reduced infectious disease, but there remains alcoholism.'

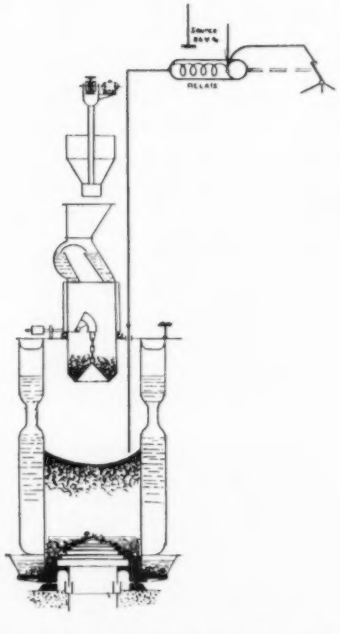
Gas and Electricity—Co-ordination

THE co-ordination of the two services was carried a step further by the recent appointment of two General Secretaries under whose conjoint authority certain 'common services' are placed. These include, among quite a number of other services, the education of technical personnel, 'industrial mobilization' and aerial defence, inspection and purchase of transport material, custody of archives, general research and organization. Chiefs of four departments of the Common Service have been appointed, as well as those of other sections.

Control of Fuel Level in Automatic Producer Gas Generators

M PIERRE VINCENT, Nancy, describes in a recent issue of *Journal des Usine a Gaz*, an electrical method. The control of the level of coke in a producer has always been a problem of some difficulty. Hand operation, still often employed, consists in ascertaining the level of the coke by inserting a rod of known length through a trial hole in the top of the producer. It requires constant supervision and in spite of all precautions presents some objectionable features. Mechanical devices also require constant supervision and the apparatus occupies considerable space on the platform. The Pomélie system patented by Gaz de France was described in March, 1951 (abstracted in this journal, May 3, 1951, p. 560), but in view of the number of producers at Villeneuve (16) the expense was considered too great and the installation of this rather complex and fragile apparatus was not repeated.

Attention was called by the electricity service to the remarkably high electrical conductivity (conductance) of coke. This property had been used in the control of the flow of coke to water-gas generators where electrodes were inserted in the feeding doors, cutting off the flow of coke at the correct point. It was decided to introduce an electrode into the producer through the trial hole, creating an electric circuit when contact was made with the mass of coke (see diagram).



The electrode, a simple steel rod, electrically insulated from the producer body-work, extends into the producer to the level below which the coke bed is not to descend. After a charge, the level of the coke descends as gasification proceeds until the point of the electrode is exposed and the circuit

(*Continued on p. 831*)

Liquid Gas . . . an investigation

An analysis of the experience so far gained in the storing and shipping of liquefied natural gas. Specially contributed by

JOHN D. CRECCA, Jnr.

INTEREST in storing and shipping liquefied natural gas has increased considerably in the U.S.A. and England in the past few years. The idea of gas liquefaction is not new. The theoretical work goes back about two centuries. In the past 15 years there have been two commercial ventures in this country to store or transport by barge liquefied natural gas. However, there has been no large scale undertaking to this date. It is the purpose of this paper to make a preliminary evaluation of such a project from a technical and economic viewpoint. Since this is a preliminary evaluation, a large portion of the design work will not be detailed. However, emphasis will be placed upon some of the unique features of the system. The end results will determine whether a further and more detailed investigation of the system would be profitable.

In order to develop the paper logically, it will be divided into five sections. They are:

(1) Introduction.
(2) The Parameters.
(3) The State of the Arts.
(4) The Proposed System.
(5) The Conclusion.

PART I.

Introduction

The establishment of a market is the first step in any business undertaking. In the case of natural gas, this market is well known. Its use as a fuel ranges from heating and cooking in the home to heating of soaking pits and the drying of crucibles in steel mills. It is also the source of the valuable LPG fuels. Perhaps the most dynamic use of natural gas is a raw material in the petrochemical industry. Although the use of natural gas as a chemical raw material is not new, the tremendous growth of this industry in recent years has been highlighted by the increased use of the gas.

It is enlightening to note that a large majority of the petrochemical industry is located within 200 miles of Houston, Texas[1]. This suggests an interesting problem in transportation. Many of the petrochemical products contain varying percentages of the elements obtained from air and water. For example, urea contains about 45% nitrogen and 25% oxygen. Ethylene glycol is another example. Water and oxygen from the air are used whether it is made from ethylene oxide or formaldehyde. The hydrocarbon is the only material not available in all market areas. Thus, it seems that one may be paying for unnecessary weight when shipping these products from the Houston area to the markets in the other parts of the country. It would seem that there would be advantages in locating these plants in areas closer to the markets. Transporation of the raw materials is a critical factor. Ethylene, a refinery by-product and basic raw material, is only transported by pipeline due to its low critical temperature (10°C.). These pipelines are at the most a few miles long. The same physical problems are faced when transporting natural gas.

Sea Transportation

Next, let us consider some of the aspects of sea transportation. It is a well-known fact that sea and barge transportation is the cheapest way to haul bulk cargoes long distances. This fact has prompted many chemical firms to investigate bulk shipping of chemicals either by conversion of tankers or new construction. The Marine Dow Chem, one of the first of these ocean-going chemical carriers, is capable of carrying a large variety of chemicals. Recently, four chemical companies have leased space to transport chemicals from the Gulf to the East.

Sea transportation offers flexibility. The ports of call may be easily changed with the demand. It also offers the possibility of exploiting foreign markets or sources of supply. The extensive inland waterway system of this country and the proposed St. Lawrence Seaway enable water-borne transportation to reach most of the industrial areas of the United States.

TABLE I
PRODUCTION AND CONSUMPTION OF NATURAL AND MANUFACTURED GAS*
(millions of therms)

Area	Production of Natural Gas	Sales Natural Gas	Sales Manufactured Gas
New England			
Connecticut	—	42.6	63.9
Maine	—	—	10.9
Massachusetts	—	156.6	107.4
New Hampshire	—	8.5	1.2
Rhode Island	—	5.8	34.2
Vermont	—	—	2.1
Middle Atlantic			
New Jersey	—	139.0	3.4
New York	36.7	1,167.5	360.5
Pennsylvania	1,091.7	2,753.4	23.7
South Atlantic			
Delaware	—	—	—
Florida	—	191.9	37.5
Georgia	—	1,194.4	11.1
Maryland	—	298.5	0.2
North Carolina	—	43.9	3.5
South Carolina	—	77.9	9.0
Virginia	—	286.2	—
Pacific			
California	5,258.5	6,727.4	—
Oregon	—	—	45.1
Washington	—	—	24.9

* *Gas Facts*, American Gas Association. Bureau of Statistics, 1953.

The natural gas markets and the advantages of sea transportation have each been covered in a general manner. It will now be desirable to analyze the combination. By reference to Table I, one may see that the consumption of gas in the coastal areas far exceeds the production. Thus, there is a need to transport most of the gas into these areas. It should be noted that the sales figures given do not include the use of natural gas as a chemical raw material. A cheap method of transporting natural gas to areas where it must be piped a long distance would enable a manufacturer to make petrochemicals without depending upon refineries or fearing varying supply due to the utilities' demands.

The flexibility of sea transportation would seem to give it an

[1] Beutel, O. E., *Petroleum Refiner*, Vol. 33, pp. 207-210 (December, 1954).

And Now

A Standing Arrangement

Housewives everywhere will greet the appearance of the **NEW WORLD** *Seventy One T.T.*

BECAUSE

- **It has oven and hot-plate side by side at table top height**
- **It eliminates the necessity for stooping**
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- **It is very moderately priced**

The Seventy One T.T. has been produced in response to an insistent demand for a Table Top Cooker. It has many of the features of the **NEW WORLD** Seventy Five plus the storage rack for pots and pans underneath.

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advantage over the fixed pipeline. It would appear that ports of call may be changed easier and less expensively than the changing of a pipeline terminal. However, one must also consider the special docking facilities that may be needed. Nevertheless, at the cost of $30,000 to $100,000 per mile for pipelines, a tanker type ship costing about $250 per ton would be cheaper to construct than a pipeline when the distances exceed 50 miles by much.

A Tantalizing Picture

The greatest opportunity offered by sea transportation of natural gas if the possible exploitation of the gas found in the Near East and around Lake Maracaibo in Venezuela. Approximately 500 to 1,000 mill. cu.ft. per day of natural gas is vented each day in the Near East. This has presented a very tantalizing picture to the British. They have had no success in their attempts to find natural gas in the United Kingdom. On the other hand, a pipeline across Europe is out of the question on a political basis alone. In this hemisphere the gas around Lake Maracaibo presents the same situation. About one-fourth of the production is recycled to increase oil production. However, there is no suitable method to move the other three-fourths to a market[2]. A pipeline would encounter the same political and engineering difficulties as encountered in Europe.

The controversy between the producers and pipeline distributors in this country increases the attractiveness of making use of the Venezuelan natural gas. Both parties agree that the rise in natural gas consumption is threatened. The producers say they cannot drill new wells at present cost if they are not free to raise the field price. On the other hand, the distributors claim that any price increase will cause many consumers to turn to coal or oil. To compound the trouble, the Supreme Court has issued a decision involving the Phillips Petroleum Company that gives control over the producers to the Federal Power Commission. It is possible that all this trouble may be by-passed if the Venezuelan gas could be obtained and transported to the Eastern markets cheaper than that piped from the south west. It is also possible that the domestic gas may be transported cheaper by sea than by pipeline, thus enabling the producer to increase his price and keep the consumer price competitive.

PART II.

The Parameters

In the previous section the broad objective of the thesis and the reasons for the investigations were stated. In this section we will consider general problems to be faced and establish the parameters.

The prime consideration of any economic study of a proposed system is its market. The uses of natural gas and the possible uses of the proposed method of transportation were covered in the previous section.

The object of this article is to investigate the commercial feasibilty of shipping liquefied methane by ocean going tanker with the intention that the system may eventually be applied to natural gas. From Table II it can be seen that the methane content of natural gas may vary considerably.

TABLE II
COMPOSITION OF NATURAL GAS IN VARIOUS PARTS OF THE WORLD

Area	Constituents			
	CO_2	CH_4	C_2H_6 etc.	N_2
Little Rock, Ark.	1.0	96.7	0.0	2.3
Bartlesville, Okla.	2.8	89.1	4.2	3.9
Los Angeles, Calif. ..	25.1	59.1	14.5	1.3
San Joaquin Valley, Calif. ..	—	88.6	11.4	—
Charleston, W. Va.	—	76.8	22.5	0.7
U.S.S.R.	0.2	97.8	—	2.0
U.S.S.R	6.1	82.1	2.1	9.7
Canada	—	80.0	7.2	12.8
Iran	—	81.0	16.0	—
Poland	—	78.8	21.2	—

However, most fields worked contain at least 80% methane. Since the thermodynamic properties will vary with the composition, the study will be made assuming a composition of 100% methane. Although this will give an extreme in the direction of higher costs as compared with a gas of lower methane content, it will give values that are satisfactory for an estimate.

[2] 'Gas Reserves Gain', *Oil and Gas Journal*, Vol. 58, p. 87 (July 12, 1954).

Any one of a number of cities may be chosen as the point of delivery. The purpose in choosing a particular one is to establish a distance from the producing area and to obtain actual consumption rates.

The city of Philadelphia was chosen as the consuming area for this investigation. It is the centre of a large populated area as well as the central point of the highly industrial New York-Philadelphia-Baltimore area.

Three producing areas, the Near East, Venezuela, and the south-west, were mentioned in Section I. Since Philadelphia was chosen as the consuming area, the Near East may be eliminated. The use of the south west and Venezuela will enable us to compare the cost of using American flag ships as compared with foreign flags. If Texas or Louisiana ports were used exclusively, only American flag ships could be used since no foreign flag ships may be used between American ports.

Possible Cargo Ships

There are three possible choices of cargo carrier. They are conversion of a dry cargo ship, conversion of a tanker, or construction of a special type tanker. Any ship constructed for a specific use is usually cheaper in the long run than one converted. However, to obtain service experience in the transportation of liquid methane, it is proposed to convert existing vessels for three reasons: (1) To minimize the initial capital risk; (2) to acquire the operational technique; (3) to make an economic study through the service experience. The vessel chosen for this purpose is the former Maritime Commission (now Maritime Administration) design T2-SE-A1 bulk oil carrier. Many of these ships which were built during World War II may be purchased second-hand now. This design was chosen because:

(a) As a tanker, it is more suited for conversion to carry liquid methane than a dry cargo vessel. The structural arrangement of a tanker permits the conversion with less alterations to deck and bulkheads.
(b) Pending the acquisition of service experience with the carriage of liquid methane, any of the petroleum products for which the vessel was originally designed can be carried simultaneously with the methane cargo, thus offsetting or minimizing any fiscal deficiency that might result from the experience.
(c) Since the other cargo to be carried is also a petroleum product, loading and possible unloading may be done in the same area.
(d) The tanker personnel by experience are more adept at handling hazardous cargoes.
(e) The size of the vessel makes it suitable for both coastal and overseas operation.

The process used in the liquefaction of the methane will have a direct bearing upon the final economic worth of the proposed system. The power cost, which is a function of the process, appears twice in the final cost estimate. It appears first as a recurrent capital charge and secondly as a fuel cost. Rubemann, as far back at 1940, showed the effect various types of cycles have on the power needed to liquefy methane.[3] Recently there have been two other systems proposed. These processes will all be covered in more detail in the section on the proposed design.

There are a number of physical problems to be faced in the proposed system. The first one encountered is the physical nature of the gas involved. Before any liquefaction processing may take place, the gas must be purified by the removal of any water, CO_2, H_2S or mercaptans in the feed. All of these substances solidify before the liquefaction temperature is reached, thus causing much trouble in the pumps and heat exchangers. In addition to this the removal of any sulphur compounds is desirable in any fuel.

TABLE III
SOME CHARACTERISTICS OF LIGHT HYDROCARBONS[4]

Substance	Formula	Boiling point °F at			Critical Temp. °F
		14.7 PSIA	100 PSIA	500 PSIA	
Methane	CH_4	−259	−204	−131	−116
Ethane	C_2H_6	−128	− 46	62	90
Propane	C_3H_8	− 44	56	186	206
i-Butane ..	C_4H_{10}	11	122	266	275
N-Butane ..	C_4H_{10}	31	146	295	306

[3] Rubemann, 'The Separation of Gases', Clarendon Press, London, 1940.
[4] Bibliography item from next page.

Table III gives some salient characteristics of the major constituents of natural gas.

Although these substances will be gaseous at ambient temperature and atmospheric pressure, most of them may be liquefied with suitable pressure at ambient temperature. However, since it is desired to obtain the extreme conditions of natural gas liquefaction by basing the design on methane, it may be seen from the above table that the methane may not be liquefield under pressure at ambient temperatures. It also will be seen in a later discussion on the State of the Arts that natural gas with only 85% methane must be cooled to −250°F. to be liquefied.

At this point, one may reason that if it is so difficult to liquefy methane, why not just use high pressure? The object of any good transportation system is to carry as much as possible. Although this idea may seem very elementary, it is basic to the idea of liquefaction of the gas. Under a pressure of 100 lb. per sq. in. the volume is reduced 8 to 1, and 35 to 1 when compressed to 500 lb. per sq. in. When it is liquefied at atmospheric pressure, this reduction in volume is about 600 to 1, which is equivalent to about a 2,000% increase over the use of pressure.[5,6] Thus, it would appear that there would be advantages to liquefying the gas both from a shipping and a storage point of view.

Insulation is an important factor in this process. The liquefied gas must be stored at the point of liquefaction until it is ready to be loaded, while in transit for four or five days, and again at the point of consumption. Thus, to make the process worth while, the evaporation losses must be low.

When considering the insulation, the first question to be answered is where to place the insulation—on the inside or outside of the metal tank. In any low temperature process, there occurs a phenomenon known as moisture migration. The air in the room around the insulation contains water vapour which exerts a higher pressure than the lower temperature moisture that may be in the insulation or trapped between the insulation and the cold metal. Thus, there is a driving force to push the room temperature water vapour through the insulation if it is porous or between the butts of adjacent slabs. This migration may result in swelling under the insulation or, possibly, rusting. It would appear that the insulation should be placed on the inside of the metal container. The placing of the insulation on the inside raises the question of thermal shock and the possible effects on the insulation and binder. These effects must be investigated before a final decision is reached.

In a cold temperature process, one must be concerned with the surface temperature of the metal coming in contact with the warm air. The temperature of this surface, which will be different from the room temperature, must be above the dew point temperature of the room air. If the surface temperature is below the dew point, then sweating will occur. This will result in increased corrosion danger.

The exact type of insulation to be used will be elaborated on in the design chapter where several types will be considered.

The requirements of the materials of construction are very simple. The tensile and yield strength must be sufficient to be used in construction and yet be ductile enough at low temperatures to prevent brittleness. It is recommended that the metal have a Sharpy Impact Test value of at least 10 ft.-lb. at −250°F. in this case.[5]

Of course, the safety factor is ever present. It is particularly critical in this design as the gas is very inflammable and the materials of construction will be placed under a severe test due to the extreme cold. An important item to consider in this connection is the location of the storage facilities. They should be suitably spaced with surrounding dikes and away from populated areas.

The boundaries within which the proposed system must be designed have been stated. The particulars of the design to fit within these parameters will be taken up in a subsequent section.

[4] 'Petroleum Refining', Foster Wheeler Bulletin 0-49-8, 2nd Ed., New York, 1949.
[5] Barnes, G. E., Braideck, M. A., Donaldson, H. H., 'Report of the Technical Consultants Board of Inquiry for the Mayor of Cleveland on the East Ohio Gas Company Fire', Cleveland, Ohio, July 1945.
[6] Huntingdon, R. L., 'Natural Gas and Natural Gasoline', McGraw-Hill, New York, 1950.

MR. HUTCHISON DROPS IN

at London Juniors' A.G.M.

THAT most energetic of I.G.E. Presidents, Mr. W. K. Hutchison, was a welcome visitor at the Annual General Meeting of the London and Southern Junior Gas Association on May 25, and no doubt the 'entertainment' which followed the meeting—a lavishly illustrated and wholly untechnical talk by Mr. L. W. Andrew on his recent visit to the U.S.A. and Canada—kindled some pleasant memories for their honoured visitor, who had also been on the trans-Atlantic trip.

Another pleasant feature of the meeting was the election (unanimous, of course) of Mr. F. C. Smith, M.B.E., as an Honorary Member of the Association. Speaking of Mr. Smith, or 'Freddie,' as he was more generally known, the President, Mr. N. R. Junkison, paid tribute to the great support he had always given the Association and the individual help he had given to so many members. 'In particular,' said Mr. Junkison, 'we remember the wonderful year of his Presidency.'

Thanking members for the honour bestowed upon him, Mr. Smith described the great benefits which he had derived from his membership of the London Juniors, and the many friends he had made. He concluded: 'I have found great comradeship in the gas industry and particularly in this Association. I hope to serve you still.'

A further tribute to the Association came from Mr. D. R. Wills, who, in proposing the adoption of the Council's Report (seconded by Mr. D. R. Lovell), said that he had found in its meetings a more friendly atmosphere, and he added a special word in praise of Mr. Junkison's Presidency and of the Association's '19th hole.' The Report was duly adopted, as was the Financial Statement at the proposition of the Hon. Treasurer, seconded by Mr. E. W. B. Dunning, and also the decision, proposed by the President, that the usual donation of ten guineas be made to the I.G.E. Benevolent Fund.

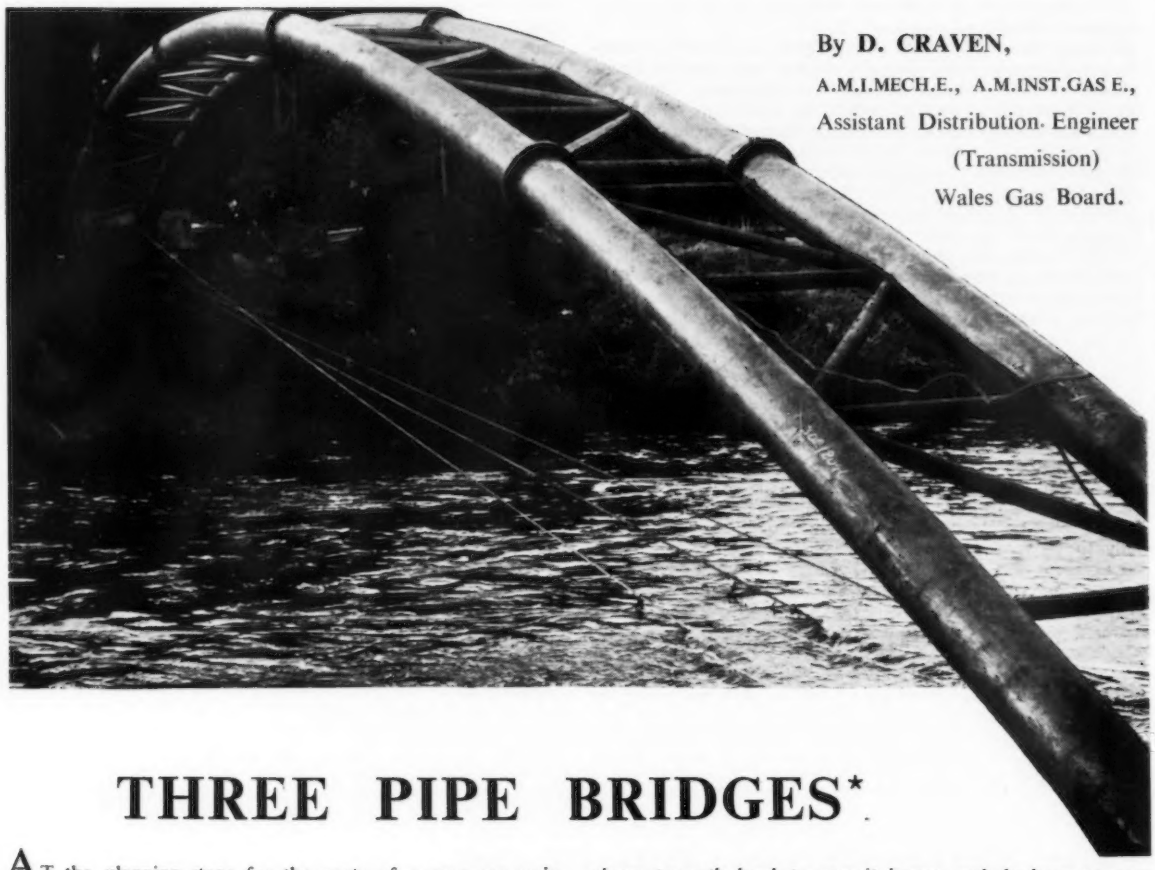
The Council's nominations for officers for the session 1956-57 were proposed by Mr. J. Bain and seconded by Mr. C. A. Wareham. The elected officers were as follows: President, Mr. J. B. McKean; Senior Vice-President, Mr. J. E. Gray; Junior Vice-President, Mr. C. H. Purkis; Hon. Secretary, Mr. J. D. Grant; Hon. Assistant Secretary, Mr. J. V. Rigg; Hon. Transactions Secretary, Mr. H. R. Cooke; Hon. Treasurer, Mr. D. G. Winslow; and Hon. Assistant Treasurer, Mr. T. J. Basford. Mr. C. A. Deas and Mr. W. Johnson were elected as Hon. Auditors at the proposition of Mr. F. C. Smith, seconded by Mr. J. B. McKean, while Mr. A. P. Porchmouth and Mr. N. T. Wait respectively proposed and seconded the election of Messrs. J. B. McKean, J. E. Gray, and A. H. Savill to serve on the District Education Committee of the Institution.

Announcing medal awards, the President referred to the winning of the S.B.G.I. Silver Medal by Mr. J. A. Prigg for his paper on 'Aerated Burners,' and of the President's Prize by Mr. J. D. Grant for his paper, 'Some Notes on the Provision of Peak Load Therms from Low Boiling Point Hydrocarbons.'

This year the task of proposing a vote of thanks to the Technical Press fell to Mr. E. A. K. Patrick, who praised the manner in which the Association's 'uninhibited' discussions were reported, and who referred to the death of Mr. A. C. Cross, Deputy Editor of the 'GAS JOURNAL,' who had served the Association well for many years.

Replying, Mr. G. W. Battison, Editor of the 'JOURNAL,' paid tribute to the quality of papers produced by the London Juniors which certainly provided the Press with a never-failing source of good material.

At the conclusion of the A.G.M. Mr. Hutchison was introduced to the meeting. Speaking of the American visit which Mr. Andrew was about to describe, he said: 'Everyone came back from that trip with different ideas, but on one thing we were all agreed—that it is an active and doing country, and if things do not work you should sling them out.'



By D. CRAVEN,
A.M.I.MECH.E., A.M.INST.GAS E.,
Assistant Distribution Engineer
(Transmission)
Wales Gas Board.

THREE PIPE BRIDGES*

AT the planning stage for the route of a new gas main, when it is found necessary to span gaps such as a railway cutting, a river or a canal, the actual position of the crossing is generally dictated by the need to avoid long deviations in the route of the main. But obvious danger spots must be avoided. A pipe bridge should obviously not be erected directly beneath high voltage electricity transmission lines. And on the bend of a river there is the possibility of the river's scouring action on the outside bank undermining the bridge foundations.

Following are details of three recently completed pipe bridges which are integral parts of the Aire Valley gas grid:—

(1) *Leeds and Liverpool Canal, Bingley.*—The most economical route for the 15-in. grid main from Bradford to Bingley crossed the canal at a point where no existing bridge was available to carry the main. After consultation with the district engineer of British Transport Waterways, it was decided to cross the canal with a 16-in. outside diameter steel main, simply supported on trestles with a minimum headroom of 11 ft. 4 in. above towpath level to permit barges and dredgers to pass beneath. To counteract a calculated sag of 2 in. in a span of 68 ft., the bridge was designed with a vertical rise of 6 in. at mid-span.

The gas main crossing the Leeds and Liverpool Canal, Bingley.

Expansion is accommodated in the underground vertical flexible socket joint on the 90° bend at the towpath side of the bridge. On the same side, the pipe cradle has elongated bolt holes which allow the cradle to slide on the trestle head.

The total cost of the structure was:

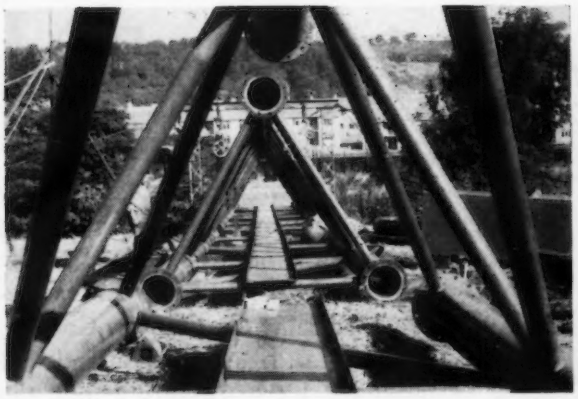
Pipe bridge and trestles—material and fabrication	£507
Erection of pipe bridge and trestles	£360
Mass concrete foundations—material and labour	£214
Total	£1,001

(2) *River Aire, Saltaire.*—The problem here was to negotiate the River Aire which, at the position selected, is 110 ft. wide. It was required to lay two mains across the river namely the 15-in. grid main already described and a 12-in. boosted pressure main.

After working on the various alternatives, it was decided to adopt a simply supported compound beam of all welded construction with three 12¾-in. outside diameter mild steel tubes acting as main booms and suitably cross-braced with 3½-in. mild steel tubes. These tubes formed an equilateral triangle having 7-in. sides with its apex at the top when viewed from an end elevation. This type of structure offered a considerable saving in weight, simplicity in construction and ease in subsequent painting and inspection, as compared with alternatives.

To maintain unrestricted gas flow, two of the 12¾-in. pipes were connected together at each end and coupled to the 15-in. grid main. Two 12-in. bore pipes connected in parallel have approximately the same carrying capacity as one 15-in. pipe of the same length. An 18-in. wide gangway was designed to run along the full length of the bridge with a permanent ladder attached at each end trestle. Expansion is accommodated in a similar manner to the Bingley Canal Bridge.

* From a paper to the Yorkshire Junior Gas Association delivered earlier this year.



The pipe bridge crossing the River Aire at Saltaire under construction. It comprises a compound beam of all welded construction with tubes acting as main booms.

Also shown under construction is the pipe bridge crossing the River Aire at Bingley. This is an arched bridge and no expansion joints were necessary.

It is estimated that a saving of at least £1,000 has been effected compared with the cost of using a separate pipe bridge carrying the 15-in. and 12-in. mains supported within the structure.

(3) *River Aire, Bingley.*—The most convenient point for the 15-in. grid main to re-cross the River Aire at Bingley was to the south of Ireland Bridge, which is a very old arched masonry structure with local historic connections. The possibility of using Ireland Bridge itself was examined but had to be discarded owing to lack of cover between the road surface and the top of the arch stonework and to the fact that planning permission would not be given to any form of attachment to the side of the bridge.

Since the fields to the south-west of Ireland Bridge are susceptible to flooding, it was decided to erect an arched structure over the river which would raise the greater part of the pipeline well clear of the water without incurring the excessive cost involved in using tall supporting trestles.

Two 12¾-in. mild steel pipes were bent so that their axes formed into the shape of a circular arc to bridge the gap of 105 ft. and were crossbraced horizontally by welding on a number of 3½-in. mild steel tubes.

No specific expansion joints were incorporated in the design since any expansion or contraction is taken up by a slight distortion in the curve of the arch.

Substantial Saving

It is estimated that a saving of £900 has been effected compared with the cost of using a separate pipe bridge to carry the main.

The main difference between this type of structure and the above canal and river bridges is the effect of thrust on the foundations. With this arched bridge the line of thrust is at 22½° to the horizontal; this is, the horizontal component of thrust is greater than the vertical (or weight) component, whereas the other two bridges exert a vertical thrust only.

Gas in France

—*Continued from p. 824.*

broken, putting into action, through relays, signals and controls of charging operations. The minimum level of coke is thus positively regulated; the maximum depends upon the weight of coke charged.

The cut in the current (which is at 24 volts alternating) is clearly shown by the resistance in the circuit which is very low (from .1 to 1.0 ohms) when the electrode is immersed in the coke, rising immediately to a very high figure when contact is broken.

The practical realization of automatic charging presents no difficulty. The cost of the equipment is almost negligible. The only precaution is to obtain good insulation where the electrode (rod) passes through the trial hole. In the case of producer gas generators the rods are seated in the holes with a refractory cement with a porcelain insulator on the top to prevent coke dust from coming into contact with the rods.

At Villeneuve all the operations of charging are controlled by the circuit-break. The attendant pushes a button which sets the train of operations in motion—movement of the skip to the coke bunkers—opening the doors and filling the skip—return of the full skip to the determined generator and the charging operations.

At Gennevilliers another electrode was added to each generator at a level above that of the correct level of the charge. If the level is too high, which might follow a failure in the circuit of the charging electrode, this is signalled to the attendant by way of a klaxon. On the other hand it was not considered necessary to control a level too low since this is indicated by a rapid rise in gas temperature which is also used to activate a klaxon.

NEW BRITISH STANDARD

BRITISH Standard 2591, Part 1:1955, applying to screw-down stop, check and gate valves, was published to meet the need for consistency in the terminology used to describe valves and their parts. Two new parts have now been published. Part 2 defines types of, and parts for, the following types of valve: Ordinary safety valve, direct spring loaded; ordinary safety valve, direct weight loaded; ordinary safety valve, lever and weight loaded; ordinary safety valve, lever and spring loaded; ordinary safety valve, 'Ramsbottom' type; and relief valve. There are seven illustrations of typical safety valves.

Part 3 defines types of, and parts for, the following types of plug valve and cock: Lubricated plug valve; non-lubricated plug valve (including lift plug and split plug types); plug cock; gland cock; compound gland cock; and packed cock. There are six illustrations of typical plug valves and cocks.

Copies of these publications may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1. Price 6s. each.

Standards for Copper Alloy Valves

Two new British Standards—B.S. 1953:1956 and B.S. 1952: 1956 are the second and third in a series for copper alloy valves for general purposes. The B.S.I. says: 'It is hoped that this series will be followed in due course by other series of standards for ferrous valves for general engineering use. The first of the new Standards is in respect of copper alloy check valves, and the second deals with copper alloy gate valves.

Copies may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1.

The stars of today . . .

Brigitte Bardot, delightful French star, made her British screen debut opposite Dirk Bogarde in the VistaVision-Technicolor comedy "Doctor At Sea". Adapted from the best-selling novel by Richard Gordon, "Doctor At Sea" is a J. Arthur Rank Organisation release, produced by Betty Box and directed by Ralph Thomas.

. . . are created by public acclaim. Cinema audiences acclaim charming Brigitte Bardot, who starred in the film "Doctor At Sea"—and housewives acclaim the Century Cooker, which features in thousands of modern kitchens throughout the British Isles.

The roles of these two stars in contemporary life are in widely differing fields, but the pre-eminence of both is the result of their fulfilling the exacting demands of their respective roles.

Star features of the CENTURY

- ★ Vitreous enamelled surfaces throughout
- ★ Cream exterior
- ★ Removable double platerack
- ★ Used oven heat vented in front of backplate to heat platerack
- ★ Four fast-boiling hotplate burners with fixed stop for simmering
- ★ Large quick-heating grill
- ★ Safety-type taps
- ★ Hotplate parts removable
- ★ Roomy oven—base suitable for slow cooking
- ★ Mainstat controls oven temperature
- ★ Drop-type oven door
- ★ Oven lights from front by flash tube
- ★ Storage space in plinth
- ★ Hotplate side extensions and gas lighter supplied if required

R. & A. MAIN LIMITED
LONDON and
FALKIRK

C 59

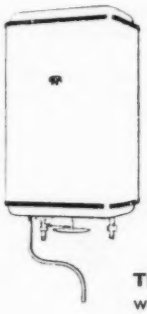
The MAIN No. 20

CENTURY COOKER

Note the name-made by MAIN

C 59

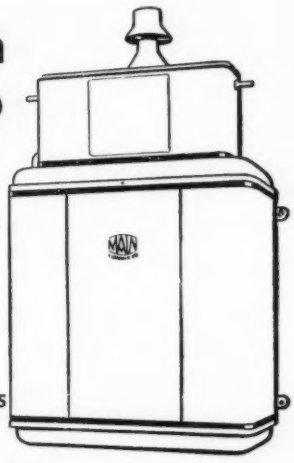
constant hot water . . .



for the sink or wash basin . . .

The Thermain No. 2 with 2 gallons capacity. Finished in cream or white enamel and with black decoration.

or from any tap in the house..



The Thermain No. 15 Multipoint with 15 gallons capacity. Finished in white or cream enamel paint.

from MAIN storage water heaters

. . . There's one for every domestic purpose

MAIN WATER HEATERS LTD.
Gothic Works, Thornton Road, Croydon, Surrey

W22

Silica Products for the Gas Industry

Yorkshire and Manchester Juniors' Joint Visit

HOPE that the carbonizing industry would be able to achieve some sort of standardization or rationalization in its requirements of silica bricks was expressed by Dr. C. Booth, Assistant Managing Director, Oughtibridge Silica Firebrick Co., Ltd., when he welcomed about 140 members of the Yorkshire Junior Gas Association and Manchester District Junior Association of Gas Engineers on a joint visit to the works, on May 17.

Dr. Booth said that in about two years' time his company would have been making silica bricks for 100 years. It was 75 years since they made the first all-silica retort which, he believed, went to Fleetwood. Since that time a great deal of knowledge has been amassed on the behaviour of silica bricks in the carbonizing industry.

If gasworks coke was used as the yardstick, production in the gas industry had increased by about 27% since 1946. Demand for gas and coke was developing rapidly; it was a growing industry. One heard a great deal how more and more gas would be produced without employing more labour, and of the possibilities of automation. 'We make a large number of bricks required by the gas industry and if we are to be called on to make a lot more we, too, should like to be able to introduce automation,' said Dr. Booth. 'Having seen the many shapes required, which must be made by skilled craftsmen using pneumatic rammers, you will realize our problems. If we are going to have to increase our output we should welcome some sort of standardization or rationalization. This is our only hope if we are to make more bricks and employ automation methods.'

Mr. G. E. Banks, President of the Yorkshire Juniors, who replied, said he was glad the Manchester Association had been able to join them on such an interesting visit. The manufacture of silica bricks was a complex and fascinating process and he was sure the visit had proved useful.

During the visit to the works members inspected Ganister rock found in the vicinity of Oughtibridge, and quartzite from the firm's quarries at Bwlchgwyn, North Wales. All silica rock received at the works is analysed for alumina content and allocated accordingly. The rock is washed on a two-stage conveyor by means of high pressure water jets before passing to the crushing, grinding and mixing plants. How quality control is carried out at all stages of manufacture to establish uniformity of product was explained in the laboratory where research work and testing are done.

Parties visited the three units of the works: Carbonizing industry silica plant, basic plant, and steelworks industry silica plant; and saw the different techniques employed to make silica bricks for the gas industry. Complex shapes are made by hand and straightforward repetitive designs by new toggle and hydraulic presses, some of prototype design. Pressure kilns of the round down-draught type of approximately 200 tons capacity are used for drying. These operate at temperatures which reach a maximum of 1,400°C. The kiln process lasts three to four weeks. Capacity of the works is between 750 and 1,000 tons per week.

Following lunch at the Royal Victoria Hotel, Sheffield, Mr. T. R. Lynam, General Manager of the Oughtibridge Company, gave a paper, 'The Character of Silica Products and their Effects on Durability in the Carbonizing Industry.'

CHARACTERISTICS OF SILICA PRODUCTS . . .

. . . their effect on Durability in the Carbonizing Industry

By T. R. LYNAM, *General Manager, Oughtibridge Silica Firebrick Co., Ltd.*

AS the result of an intensive geological survey carried out at our Bwlchgwyn quarries in North Wales, it is possible to predict the quantity and quality of raw materials to be made available in the future. It is our endeavour to obtain a *uniform* product for both the gas and steel industries. That is why all our raw material is analysed wagon by wagon and washed prior to use. While Fenner only recognized three forms of tridymite and two each of quartz and cristobalite, together with silica glass giving a total of eight forms, Sosman in a recent paper to the Ceramic Society at Harrogate enumerated seven new phases, making a total of 15. These are: *silica w* with a density of 1.98 which is unstable in damp air, forming silicic acid which soon polymerizes to silica gel; four *high pressure phases*, formed only under extremely high pressure varying from 30 to 1,250 kilo bars. (1 kilo bar = 1,000 atmospheres); *tridymite*, the phases of which have been increased from 3 to 5 by recognition of two additional inversion temperatures, namely at 210°C. and 475°C.; *cristobalite*, of which there are only two known phases; and *amorphous silica* (silica glass) which is formed at the melting point of silica, 1,723°C.

Physical Properties

Specific gravity is of major importance since this property is the best indication of volume stability during service and the standard specification for refractory materials for the gas and coking industries operative from April 1, 1955, states that for lime bonded silica material the average value of the true specific gravity shall not exceed 2.345, the sample being six pieces from a consignment. Such a specification can only be complied with by rigid firing control and kiln testing. Kiln draw trials must possess the following specific gravity values before the kiln is put out: Kiln crown or top 2.32, kiln sides 2.33, and kiln wicket 2.34. The wicket or door is the coolest part of a kiln and should not be set with coke oven shapes.

It is our endeavour to produce silica bricks with as low a quartz content as possible, preferably nil, and as high a proportion of X tridymite as possible as it is the lowest specific gravity form found in silica bricks and possesses the maximum volume stability. The heat treatment applied during kiln-firing, to give such inversion, will ensure that a high degree of uniformity is obtained throughout the coke oven battery or retort setting.

The reversible thermal expansion of the brick, which controls the volume movement during 'heating up,' also depends on the heat treatment received and the final inversion phases. Further checks on inversion and type of inversion are carried out by petrological examination.

Bulk Density

The next important characteristic is that of bulk density coupled with porosity and permeability. These play an important part in thermal conductivity and scurfing. The higher the bulk density, the lower the permeability, and the higher the conductivity the less the tendency towards resistance to scurfing. These important characteristics are only referred to from the sampling angle in your specification. The introduction of Silcrete has revealed the effect of bulk density and porosity on service in the open hearth furnace. The more silica per cubic inch the greater the resistance to attack of any kind. The possibilities of this material are by no means fully realized. Increased density means higher conductivity which, together with higher structural strength and stability, can lead to the use of thinner walls, greater volume charge and marked increase in efficiency, in fact, an entirely new approach to retort design by using this material throughout.

To some extent, the size and shape of the brick control density, particularly in the case of complex rammed shapes, and although careful control is maintained over batch grading and moisture content, etc., a fairly high deviation in porosity is bound to occur.

The ideal would be to hydraulically press all shapes at a constant pressure per square inch of brick surface, but as well over 10,000 different shapes are manufactured by O.S.F. alone, some in relatively small quantities, the operating costs of presses and expensive press moulds must be borne in mind.

The gas engineer's specification has always laid particular stress on the after-expansion test or the permanent linear change on reheating test. This is only natural, but this test is most misleading, since the rate of heating during test bears no resemblance to that used in the 'heating up' of any furnace structure, let alone retort or coke oven. The rapid release of strains set up during test causes interstitial cracking giving results which are neither repeatable nor bear any relation to other determined properties of the brick.

An intensive statistical investigation into the relationship between firing expansion, specific gravity and after-expansion of silica bricks has been carried out on 350 test specimens. This revealed a significant relationship between kiln firing and specific gravity, but the cracking of test pieces in the after-expansion test led to less significant results. It was found that in one batch of bricks 8% failed in the specific gravity tests whereas 15% of the same batch failed by after-expansion tests. We are very much aware of the importance that the gas industry places on silica products being reasonably true to size. It should be pointed out, however, that some brick sizes are such that even when the G.E.S. tolerance is permitted no joints are left. Obviously the designer has enjoyed too much licence and asked for the impossible.

Importance of Size

Size must be considered together with specific gravity. A large brick of relatively high specific gravity may be true to size and accepted. A similar brick may be 1.5% oversize but of low specific gravity, making it stable in service. The accepted brick, however, would expand by 1% during service with obvious ill effects. The use of bonders which stretch from oven face to oven face without a parting joint must be deplored, as such a design allows no tolerance in size whatsoever.

The standard specification says that the texture of the surfaces and of the interior shall be uniform and reasonably free from holes, cracks, flaws or large nodules, and the arrises shall be good. Silica and clay bonded siliceous and semi-siliceous refractories shall be free from deleterious iron or other spots. A definition of deleterious spots has caused more bitter feelings in the silica brick industry than any other point of difference between user and manufacturer. The greatest care is taken in the preparation of raw materials, in grading, moulding and in the firing of the extremely complex shapes. Electric magnets have been installed in the grinding section but even so, many thousands of pounds worth of first-class silica products have been rejected because of a so-called deleterious iron spot on the working face or on other faces, even on the bedding planes.

But from our own researches we know that under working conditions in the carbonizing industry, in gasworks and in coke oven plants, such iron spots are not deleterious. The Germans, too, are in full agreement with us and have offered to accept our proposal, to build a complete retort in black or high iron silica, in other words, of one complete iron spot, as they know that this retort will give an even better life than ordinary white silica. It is gratifying to find that the members of the gas industry are showing signs of accepting this point of view; perhaps the coke oven people will soon follow their lead.

Present-day silica material is really too good for the use to which it is put as it will last for up to 20 years. In the last 22 years of manufacturing silica materials this firm has not had a single complaint of the behaviour of its products during service in either retort setting or coke ovens.

DISCUSSION

Professor G. White, Dyson Professor of Refractories Technology, Sheffield University, who opened the discussion, said developments in silica products since the war had been accelerated by laboratory research work. The question had been raised whether iron spots promote carbon de-composition. Iron oxide could only promote carbon de-composition as the temperature fell below 600°. Before there was carbon de-composition from CO reaction one only got carbon in the atmosphere. The iron oxide was reduced to metallic iron. Carbon deposits were affected by a great many catalysts in different ways. Carbon could develop without the presence of iron. Carbon decomposition was very sensitive to the presence of other materials, particularly sulphur. Sulphur could poison the catalyst preventing de-composition. He did not think carbon de-composition was a real problem; the small quantity of iron that was present would not have a major effect on silica attack.

One member said he considered the gas engineers' specification for silica bricks was very poor indeed and one of the main things left out was that of bulk density.

Mr. Lynam said it was their endeavour to get down to an average specific gravity value of 2.32. He had pointed out that the higher the bulk density the lower the permeability. Some relationship existed between permeability and scurfing. If there was a poor structure in the cells something was provided for the carbon to fasten on to.

Information was sought on jointing materials appropriate to silica materials. Mr. Lynam said there seemed to be need of a much more serious approach to cements for jointing purposes. He saw a coke oven structure in South Wales where the cement used was red. It was an oxide material. The whole of the joints were black iron spots, yet it was found to be an excellent cement. Obviously the cement was always the weakest part of the coke oven or retort.

Mr. H. Partington, President of the Manchester Junior Association, thanked the firm for the facilities for the visit, and Mr. Lynam for his paper. What impressed him was the desire to introduce automation, but he realized the problems in the complicated field of refractories when many different and complex shapes were required. He wondered whether the method used by one firm of pipe manufacturers could be applied in the silica brick industry. This was to break the whole thing down into small standard parts and use them to build up the more complex units stage by stage. This was termed standard specials and certainly had eliminated much of the costly casting work.

MODERN COKE OVENS

SIMON-CARVES LTD., of Cheadle Heath, near Stockport, have just published a new brochure on the types of coking and by-product plant made by them. The first part contains a most lucid description of their system of coke oven construction embodying the well-known method of heating by rich gas the under jet oven. This method of heating embodying the principles of the Otto oven has marked advantages over the gas gum injection, in that the calibration of burners can be carried out easily and the uniform heating along the length of a tapering oven can be more easily accomplished.

The diagrams showing their method of wall construction, the regenerator arrangement, the adoption of expensive silica material for the zones of highest temperature only, efforts at fuel economy including the unusual design of regenerator filling, so different from the conventional 'soap,' show clearly how much this firm is making full use of modern techniques, and the result of research from their own laboratories.

As the gas industry becomes more interested in the surplus gas available at coke oven plants, so will contractors find more interest among iron and steel manufacturers and the National Coal Board in the compound coke oven. The single flue compound oven with combustion air drawn from the cellar would, it would seem, improve conditions for the 'gas men' and the new Wolf self sealing door be a solution to a rather primitive and not completely efficient means of preventing crude gas leaks on a large scale by cutting out the luted door.

The whole publication is most lavishly produced, and the photography of the various plants built by Simon Carves Ltd. throughout the world, including the United States, gives a good idea of how extensive are the firm's activities.

COMPANY NEWS

DRAKES, LTD.

TRADING activities of the Drakes Ltd., Halifax, group for the year ended December 31, 1955, show approximately the same results as the previous year, stated the Chairman, Mr. John Armitage Drake, in his speech acompanying the annual report. 'The year has been a difficult one from a trading point of view, as the gas industry, which is our major field of activity, has again shown a disinclination to undertake heavy expenditure on carbonizing plant,' he continued.

The engineering subsidiary had been exceedingly short of work in several departments, and in other departments, while having a reasonable amount of orders on hand, had suffered from the shortage of steel.

The directors were actively negotiating certain proposals which they felt sure, if brought to a successful conclusion, would prove of great advantage to the group, but in his opinion, it would be unwise to give any indication as to the nature and extent of these negotiations until they were completed.

Net profit of Drakes, Ltd., for the year was £13,633 (against £11,047 last time). Dividend on ordinary shares is 10%, less tax, amounting to £4,887 (£4,675). £35,972 is carried forward (£37,029).

WELLINGTON GAS COMPANY

OUTPUT of gas from the works of the Wellington (New Zealand) Gas Co., Ltd., exceeded 5 mill. cu.ft. in one day for the first time in the history of the company, and the output for July amounted to 134 mill. cu.ft., which was an all-time record, said Sir Charles Norwood, Chairman, at the annual general meeting in Wellington in February. The revenue for the year totalled £662,796—an increase of £10,236 compared with the previous year.

There had been constant anxiety on account of shortage of coal supplies. Stocks improved somewhat towards the end of the year but quality had not been good. An acute shortage of labour had been experienced throughout the year. This had been costly to the company and had brought it at times to near danger point.

Final dividend of 3% was recommended on ordinary shares making 6% for the year, making a total payment of £16,728 12s. Carry forward was £58,441—an increase of £37,708 compared with previous year.

Appliance sales had continued throughout the year at a steady rate and all items of equipment had shown an increase over the 1954 sales. The high rate of efficiency and performance of modern gas appliances had continued to attract the public to their use.

In August conversations between the Chairmen of the Auckland, Wellington, Christchurch, and Gisborne Gas companies and members of the Government had been held, when the Government plans for the future of the gas industry were discussed. Subsequently the Government had indicated that it was their policy to co-ordinate gas undertakings with electric supply authorities on a local basis.

In October the Electricity and Gas Co-Ordination Committee Act had been passed and since then a committee of five had been set up to advise the Minister in charge of the State Hydro-Electric Department as to methods of implementing Government policy.

As a result the Wellington City Corporation and the City Council had set up a special committee to discuss the acquisition of the company's undertaking by the Council. As yet no finality had been reached.

OVER 100 YEARS' EXPERIENCE IN THE CONSTRUCTION OF ALL TYPES OF GASWORKS PLANT

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STEEL CONSTRUCTIONAL WORK

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70, VICTORIA STREET, WESTMINSTER, S.W.1. LONDON PROVIDENCE IRON WORKS, MILLWALL, E.14.

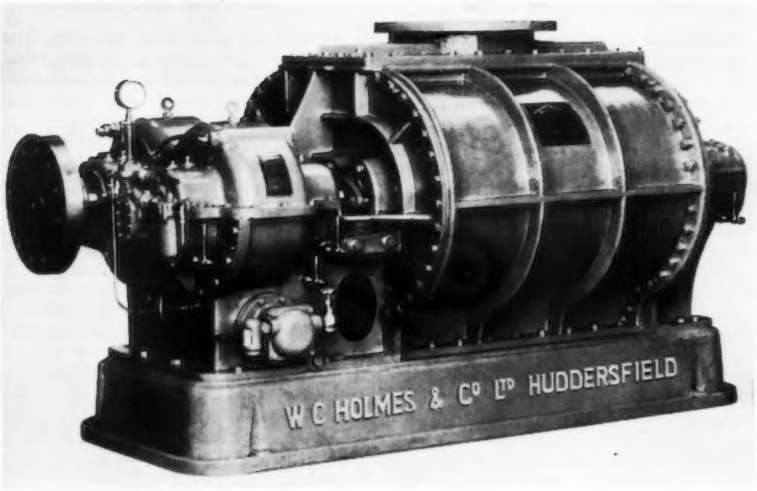
TRADE NEWS

Machines re-designed

Holmes-Connersville blowers, boosters and exhausters have been recently re-designed, and are now known as 'H' type machines. While retaining the previous well-proved essential features, the new models incorporate many improvements both in construction and appearance. As in the case of the earlier types they are built for long and continuous operation with minimum attention and maintenance.

The main alterations are the re-designed and improved type glands with deeper stuffing boxes which have proved to be absolutely gas tight, and larger diameter shafts which tend to put the machine beyond the limits of torsional vibration difficulties. Overall length has been reduced by incorporating the outer bearings in the main headplate, and gear box casting, which also facilitates accurate machining and assembly.

In addition, the cylinder is now bolted on to the baseplate, and this together with the reduced length and larger diameter shafts greatly increases mechanical strength.—*W. C. Holmes and Co., Ltd., P.O. Box No. B7, Turnbridge, Huddersfield.*



New 'H' type Holmes-Connersville machine.

Vibration Eliminator

The first standard seamless metallic flexible vibration eliminator for general engineering requirements to be manufactured in Britain has been developed by Compoflex Co., Ltd. It is claimed to have the highest fatigue resistance of any eliminator in the world and, when used with rigid piping as a composite assembly, to provide the lightest form of metallic flexible piping with the minimum of flow resistance.

The eliminators will be available in copper alloy for use in situations where temperatures up to 250°C. and pressures to 450 lb. p.s.i. are experienced. For higher temperatures and pressures they will be made in Monel and in stainless steel, which are suitable for temperatures up to 400°C. and pressures to 1,000 lb. p.s.i. Special assemblies can be produced for even higher temperatures and pressures.

The eliminators, which are of seamless helical tubing covered generally with a bronze braiding, will be available in bore sizes ranging from ¼ in. to 2 in. They will be supplied either with a sleeve at both ends, into which standard sizes of rigid piping can be brazed, or with a sleeve at one end and a suitable BSP union nut and nipple at the other. These end fittings can be fixed direct to rigid piping supplied by customers to the Oldham factory of Compoflex Co., Ltd. Alternative end connections can be manufactured for specialized requirements, and for the higher specified temperatures fire-resistant connections will be available.

The eliminator is designed for installations which have pipes prone to misalignment, or exposed to vibration, as it is sufficiently flexible to absorb vibration and to relieve stresses arising from temperature changes in pipe lines. It takes the place of coiled piping, sliding joints, etc., and also of rigid connectors made up on site. Piping assemblies incorporating the new metallic flexible can be mass pre-fabricated, where otherwise it would be necessary to design rigid tailor-made piping.

It is claimed that the eliminator will operate efficiently on gas and air compressor delivery lines, refrigeration compressor lines for industrial and domestic purposes, steam lines in industrial and marine boiler plants, fuel oil and air systems of road vehicles, fuel and gas lines in aircraft, and liquid and gas lines in chemical plants.—*Compoflex Co., Ltd., 26, Grosvenor Gardens, London, S.W.1.*

Distribution Board

To extend their range of heavy duty switchgear, Lancashire Dynamo Switchgear, Ltd., introduce 'Oxted' distribution boards, designed to stand up to the most adverse site conditions, and to appeal to the discerning engineer seeking a robust, reliable distribution board built to the same high standards as the 'H.I' and 'Uni-front' switchgear.

'Oxted' distribution boards are of the heavy industrial dust and weather-tight wall mounting type, fitted with h.r.c. fuses to BS88/1952. Cases are fabricated in steel of ¼ in. minimum thickness and complete with external wall-fixing lugs, while covers are fitted with adjustable hinges and bonderized cork gasket with sufficient fixing bolts to ensure cover is under pressure at all points. Padlocking facilities can be provided if required, and provision is made for spare fuses. All live metal is protected against contact.

Separate end plates are fitted which can be drilled to suit any cable arrangement; isolating switch can be fitted either top or bottom if required; all metal work is bonded to earth terminal fitted to side of case; and finish boards are primed with undercoat and receive a top coat of acid resisting synthetic light grey enamel paint.—*Lancashire Dynamo Switchgear, Ltd., Hurst Green, Oxted, Surrey.*

Vee Link Belt

As an addition to their extensive range of manufactures for the power transmission industry, R. and J. Dick, Ltd., announce the introduction of Dixlink to complement the Dickrope-plus rubber Vee-rope for use where an endless unit is not suitable owing to structural restrictions or fixed centres.

Made of pure natural rubber, cotton duck woven with high grade steel studs, Dixlink is manufactured in various sizes covering the M, A, B, and C Vee-rope range with 40° angle and the 28° angle sections, and is normally supplied in coils of 50 ft. It is also available in oil, heat, and fire-resisting qualities.

A belt of any length can be detached from stock and installed in a matter of minutes; dismantling costs are eliminated; belts can be fitted to any length; each belt takes its share of load, eliminating uneven wear; construction allows free air circulation to dissipate friction heat; and because Dixlink can be quickly adjusted the cost of slide rails or special motor bases is saved.—*R. and J. Dick, Ltd., Greenhead Works, Glasgow, S.E.*

Anti-Corrosion Tape

Scotchrap, the adhesive-backed plastics pipe wrap tape, contains corrosion inhibitor and has been specially developed for the protection of pipes against corrosion. The tape is chemically inert, will not deteriorate, has high insulation resistance and, unlike textile tapes, will not harbour corrosion-promoting bacteria or fungi. Unlike many other inorganic pipe wrapping materials, the ability of Scotchrap to conform to the intricate contours of fittings, etc., means that 100% coverage and sealing is easily attained. It is made in Britain to the formula used by the Minnesota Mining & Manufacturing Co. of the U.S.A., and has their years of experience behind it. Recent improvements include super-conformance over a wide range of temperature and a pressure-sensitive adhesive containing a corrosion inhibitor, plus the ability to grab and hold.

It is quick, easy, and clean to apply. There is no messy dressing, and no heat or moulds are necessary. It is not easily damaged and because it can be economically applied on site—even to long lengths of pipe—it is often better than factory wrapping, which is more liable to damage in transit. It is highly resistant to abrasion and will not be penetrated even by such notorious backfills as cinders. Only when the backfill contains a high proportion of sharp stones are any special precautions necessary.—*Abbott, Birks and Co., Ltd., 90/91, Blackfriars Road, London, S.E.1.*

'Fluolion'

'Fluolion' is the registered trade name for James Walker products manufactured from polytetrafluorethylene, more commonly called PTFE. It is the most chemically inert of all the wide range of the plastics family and is unaffected by practically all known chemicals including acids, alkalis and solvents. Only molten alkali metals, chlorine trifluoride and fluorine at elevated temperatures have been known to attack it. It is suitable for use over a very wide temperature range of the order of—80°C. to +300°C. although for some applications this range must be modified. It has excellent physical properties and a low coefficient of friction. It is tasteless, odourless and non-corrosive, and, within its temperature range, will not contaminate any material with which it is in contact, including edibles.

The range of 'Fluolion' products includes packings, jointings, and gaskets suitable for very difficult services and especially chemicals and acids of a highly solvent or corrosive nature for which no other known packing or jointing material is entirely satisfactory. The properties which have enabled PTFE to play an important part in the packing and jointing industry have enabled its use to be extended far beyond the packing and jointing field—it is, for example, an excellent electrical insulating material. Its many uses are described in an illustrated brochure, 'Fluolion.'—*James Walker and Co., Ltd., Lion Works, Woking, Surrey.*

Production Increased

As part of a plan to centralise and expand their production of flexible hoses, the Wimbledon factory of Compoflex Co. Ltd., has been closed and production capacity and machinery transferred to the main factory at Oldham. The manufacturing capacity of the Oldham works has recently been increased by one-third, by the acquisition of an additional 30,000 sq. ft., which will enable the company to absorb the Wimbledon production capacity, and, at the same time, cope with the general all-round increase in demand for flexibles. The design and development establishment will remain at Godalming, Surrey, and the address of the flexibles advisory centres are also unchanged.—*Compoflex Co., Ltd., Huddersfield Road, Oldham.*

Roof extraction unit

Our picture is not of some gigantic mushroom in a most unlikely place; it is an example of a roof extraction unit by Phoenix Heating Ltd. Inside is a fan.

Made of indestructible 'Fibreglass' the unit is claimed to be resistant to all weather conditions—and it is not necessary to paint it.

It is said to be suitable for the ventilation of: 'Dangerous gas areas,' offices, spray shops, garages, process areas, kitchens, and other places. Details can be obtained from—*Phoenix Heating Ltd., 17, High Street, Egham, Surrey.*

Carrier Case

Easterbrook, Allcard and Co., Ltd., now supply their new improved chaser die stock, pattern No. 1150R in a strong metal carrier case, with handle. For the pipefitter this is a convenient way of carrying a die stock, together with three spare sets of dies. For the storekeeper it means a tidier store and assists in checking that tools on loan are returned as issued.—*Easterbrook, Allcard and Co., Ltd., 230, Penistone Road, Sheffield, 6.*

New Name for British Graders

British-built Galion motor graders have been in production for some years and have gained a first class reputation, especially in Commonwealth and overseas countries. For reasons of inter-company policy, the name of the British company, Galion (Great Britain), Ltd., of Wakefield, has been changed to Construction Machinery, Ltd., and British-built Galion motor graders are now to be known as Wakefield motor graders. The change does not affect the graders themselves, specifications being exactly as before.—*Construction Machinery, Ltd., Thornes Moor Road, Wakefield. New cable address, Graders, Wakefield.*

Electronic recording thermocouple pyrometer

A temperature recorder which operates in conjunction with thermocouples can be supplied for use with either base metal or precious metal thermocouples, in various ranges from 0-300°C. upwards. The instrument has been designed for industrial use and the motor driven pen is positioned by an electrical servo system from a high grade electrical meter.

Automatic cold junction compensation is provided and the equipment has an accuracy of ±1%. It is, therefore, suitable for use in many of the applications which would otherwise necessitate a D.C. potentiometer, for although the accuracy is not quite as high as that obtained with potentiometric equipment it is claimed to be adequate for the vast majority of industrial applications. And it is much cheaper.

Known as the 'Pyro-Servograph' this recorder has been designed to give long trouble-free service and the mechanism has been kept as simple as possible. Gearing and moving mechanical parts have been cut down to a minimum and the simple electronic chassis itself is an interchangeable plug-in unit.

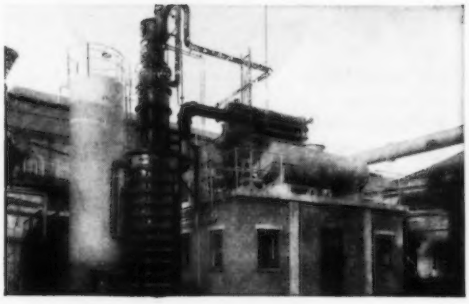
The instrument has had extensive field tests and has been evaluated in the plants of the major chemical, steel and petroleum undertakings, say the makers. Further details can be obtained from Publication No. 233 or from Sales Promotion Manager.—*Fielden Electronics Ltd., 21, Buckingham Street, London, W.C.2.*

Welding Gun

The Griesheim electrically and gas heated TP welding gun is designed for welding thermoplastics including PVC, Polythene, Nylon, and Perspex. It is exceptionally well balanced and simple to use, and is issued complete with 17-page instruction book. It is produced by Knapsack-Griesheim A/G, of Frankfurt (Main), Western Germany, the agents, Norwitch Smith and Co., Ltd., holding heavy stocks and all the necessary spare parts, and facilities for providing a comprehensive maintenance service.—*Norwitch Smith and Co., Ltd., Pensnett, Staffordshire.*

Wilton

GASWORKS AMMONIA PLANTS



Wilton crude concentrated ammonia plant

PROCESS PLANT

for crude concentrated ammonia
pure ammonia
sulphate of ammonia
aqueous ammonia
anhydrous ammonia

Contracts for complete ammonia plants and other gasworks by-product plants can be carried out in their entirety, from initial planning and technical design to construction and commissioning, including structural, civil and electrical engineering work.

Chemical Engineering Wiltons Ltd

SIMON ENGINEERING GROUP

BIRD HALL LANE, STOCKPORT, CHESHIRE Telephone: Gatley 5231. Telegrams: Wiltonstil, Stockport.

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CW6a

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P3024 NORMALISING FURNACE. Extensively used by leading steel and pipe manipulators. Standard patterns for pipes ½" to 30" dia. Complying with B.S.S. 1821, 1952. Larger sizes can be quoted for against specifications.

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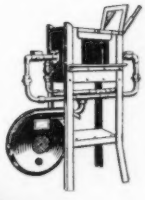

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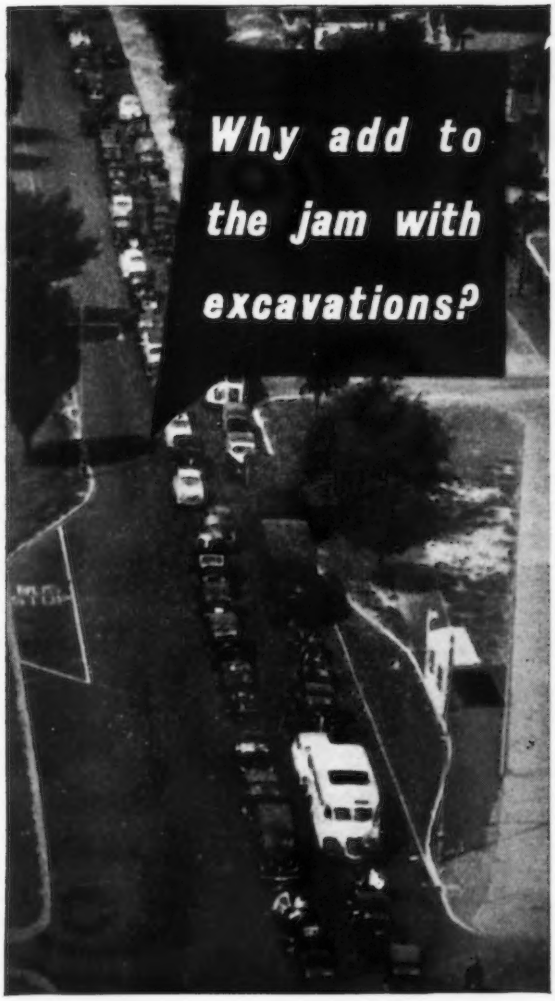
Telephone: Stourport 311-4 Telegrams: Yadall, Stourport.



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PUBLISHERS' NOTICE

The " Gas Journal " is published every Wednesday, price 1/6d.; by post 1/8d.

Subscription Rates: Home and Empire:—60/- per annum; Foreign:—70/- per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 2/- per line (approx. 7 words)—minimum charge 10/-. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10 in. deep × 7 in. wide; block screen 120.

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APPOINTMENTS VACANT

BOROUGH OF COLERAINE

APPOINTMENT OF GAS MANAGER AND ENGINEER

THE Coleraine Borough Council invite applications for the post of MANAGER and ENGINEER for their Gas Works—output approximately 178 mill. cubic feet per annum.

The Council provide a free house (recently erected), fuel and light.

Applicants should state age, qualifications and experience and give full particulars of experience with Vertical Retorts, Carburetted Water Gas Plants and in the gasification of oil. Applicants should also state salary expected and give the names and addresses of two referees.

The usual preference will be given to " ex-service " applicants.

The appointment will be subject to the provisions of the Local Government (Superannuation) Act (N.I.) 1950.

Applications will be received by the undersigned not later than June 30, 1956.

W. E. HENRY,
Town Clerk.

Town Hall,
Coleraine,
Northern Ireland

EASTERN GAS BOARD

DIVISIONAL ENGINEER

APPLICATIONS are invited for the post of DIVISIONAL ENGINEER of the Ipswich Division of this Board.

Candidates should have had a sound training in the Industry and should hold good technical qualifications. They should be Corporate Members of the Institution of Gas Engineers and, preferably, hold a University degree or other additional qualification.

The successful applicant will be concerned with the whole field of gas engineering and should have had experience of both manufacture and distribution.

The salary will be in the range of £1,500 to £1,750 according to qualifications and experience.

The successful candidate may be required to pass a medical examination and, unless already subject to a pension scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme within six months from taking up the appointment.

Applications, giving brief details of the candidate's training and career, together with the names of referees, should be addressed to the undersigned to reach him by June 23, 1956.

R. H. EPPS.
Secretary to the Board.

2, The Abbey Garden,
Great College Street,
Westminster, S.W.1.

June 14, 1956.

WEST MIDLANDS GAS BOARD

WOLVERHAMPTON & DISTRICT DIVISION
WORKS FOREMAN
SEDGLEY DISTRICT

APPLICATIONS are invited for the above appointment.

Candidates should have experience in the control of a small undertaking and some knowledge of the operation of Woodall-Duckham vertical retorts and gasworks ancillary plant, and should preferably have had a mechanical training.

The salary for the post will be in accordance with Grade A.P.T. 6 (£610 × 20—£690) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. S. Jones, Divisional General Manager, West Midlands Gas Board, Kensington House, Bath Street, Dudley, to reach him not later than June 25, 1956.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

SHROPSHIRE DIVISION
TECHNICAL ASSISTANT
SHREWSBURY DISTRICT

CANDIDATES should preferably have had experience of continuous vertical retorts and C.W.G. plant and routine chemical testing and, in the absence of the Carbonising Superintendent should be capable of controlling the day to day operation of the retort house.

The salary for the post will be within Grade 5 (£575-£655 per annum) of the National Salary Scales.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. W. Oldham, Divisional General Manager, West Midlands Gas Board, Sidney House, School Court, Shrewsbury, to reach him not later than June 25, 1956.

J. C. INGRAM,
Secretary to the Board.

NORTH WESTERN GAS BOARD

MANCHESTER INDUSTRIAL GAS DEVELOPMENT CENTRE
DEVELOPMENT ENGINEER

APPLICATIONS are invited for the above pensionable appointment at a commencing salary of £1,500 per annum.

The duties involve responsibility to the Industrial Engineer in charge of the Centre for the investigation, development and testing of new industrial applications for gas, and the successful applicant will be required to lecture on gas utilisation to Student Engineers taking a sandwich course at the Salford Royal Technical College.

The Manchester Centre covers roughly the eastern half of the Board's Area, and caters for a wide variety of industries, many of the heavy type.

Applicants should have wide experience in industrial gas utilization. A summary of experimental work carried out in this field should be submitted together with details of the candidate's age, qualifications and a list of positions held, in order to reach the General Manager, Manchester Group, N.W.G.B., Town Hall, Manchester 2, not later than Thursday, June 28, 1956.

(*Classified advertisements continued on page* 842)

APPOINTMENTS VACANT (ctd.)

BOLTON METAL PRODUCTS, LTD., require a SALES REPRESENTATIVE to cover East and West Midlands Gas Board Areas. Car provided. Applications should state age, experience and salary required and be addressed to:—The Sales Manager, Bolton Metal Products, Ltd., Duckworth Street, Bolton.

EAST MIDLANDS GAS BOARD

SHEFFIELD AND ROTHERHAM DIVISION
SUPERVISOR—PUNCHED CARD INSTALLATION, SHEFFIELD

APPLICATIONS are invited for the position of MALE (or FEMALE) SUPERVISOR of the Punched Card Installation in the Sheffield Offices at a salary in accordance with Grades A.P.T. 7 and 8 of the National Salary Scales for Gas Staffs (Males £670-£790 per annum. The female scale begins at £572 per annum and rises eventually to the maximum of the Male scale).

Candidates should be experienced in the control of staff and capable of utilising to the full the comprehensive 65 column installation at present in use.

The installation handles analysis of all expenditure, hire purchase accounting, remittance statements, etc., and it is desirable that applicants have a knowledge of accountancy.

The post is pensionable and the successful applicant will be required to pass a medical examination.

Applications, stating age, education, qualifications and giving details of experience, together with the names and addresses of two referees should be addressed to reach the undersigned not later than July 2, 1956.

C. C. WOOD,
Divisional General Manager.

Commercial Street,
Sheffield, 1.

June 8, 1956.

EAST MIDLANDS GAS BOARD

LINCOLNSHIRE DIVISION
SENIOR HOME SERVICE ADVISER—GRIMSBY GROUP

APPLICATIONS are invited from suitable persons for the above appointment at a salary within Special Grade 6 (£492/£640) of the National Salary Scales for Gas Staffs. The commencing salary will be in accordance with qualifications, experience and ability.

Candidates should be in possession of a recognised diploma in Cookery and/or Domestic Science and have had considerable experience in the practical demonstration of gas cooking, laundering and other appliances, and be able to advise consumers on all domestic problems involving the use of gas in the home. Additionally they should be experienced in the control of staff, arranging demonstrations, addressing public gatherings and the general administration of a Home Service Advisory Section.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Holiday arrangements for the present season will be honoured.

Applications stating age and giving details of education, qualifications and experience, together with the names of two referees should be addressed to reach the undersigned not later than Saturday, June 30, 1956.

BERNARD CLARKE,
Divisional General Manager.

Belle Vue House,
Carline Road,
Lincoln.

June 7, 1956.

EAST MIDLANDS GAS BOARD

LEICESTER AND NORTHANTS DIVISION
LOCAL SUPERINTENDENT—ASHBY-DE-LA-ZOUCH

APPLICATIONS are invited for the appointment of Local Superintendent, Ashby-de-la-Zouch. The post is graded A.P.T. 5/6, Provincial A (£575/£690).

The successful applicant will be responsible for Sales and Service in the Ashby and Measham Districts (approximately 1,650 consumers) and will be required to undertake certain standby duties, on a rota basis, in connection with the grid reception/holder station, for which an appropriate payment will be made.

A modern house is available on reasonable terms under a Service Occupation Agreement.

The appointment is pensionable and the successful applicant will be required to pass a medical examination.

Applications stating age, present position and qualifications, should be addressed to reach the undersigned not later than Thursday, June 21, 1956.

H. B. TAYLOR,
Divisional General Manager.

Millstone Lane,
Leicester.

SCOTTISH GAS BOARD

DUNDEE GROUP—DUNDEE DISTRICT
TECHNICAL ASSISTANT (CONSTRUCTION)

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT (CONSTRUCTION) with the Dundee Undertaking of the Scottish Gas Board.

Applicants must have experience in the preparation of Specifications, Estimates, Layout of Works Plans for development of Works Plant, and Supervision of Erection of New Plant.

The Salary applicable to this post will be within Grades A.P.T. 7/8 of the National Salary Scales (£670-£790 per annum) with placing according to experience and qualifications. The post is superannuable and permanent appointment is dependent on the successful passing of a Medical Examination.

A house will be available to rent, if required.

Applications, stating age, training, experience and qualifications, together with any testimonials, should be lodged with the Undersigned within 14 days of the appearance of this Advertisement.

W. S. JOHNSTON, B.Sc., M.Inst.Gas E., M.Inst.F.,
Group Manager.

Scottish Gas Board,
Dundee Group,
50, East Dock Street,
Dundee.

SCOTTISH GAS BOARD

KILMARNOCK GROUP
GROUP DISTRIBUTION SUPERINTENDENT

APPLICATIONS are invited for the position of GROUP DISTRIBUTION SUPERINTENDENT for the Kilmarnock Group.

The salary will be within A.P.T. Grade 10, Provincial 'A,' with placing according to qualifications and experience.

A modern house is available, at a reasonable rent, to the successful candidate.

Applicants should possess the Higher Grade Certificate (Supply) of the Institution of Gas Engineers, or an equivalent qualification, and should be experienced in all branches of gas utilization and transmission at both low and high pressures. Sound training and experience in the planning, estimating and supervision of distribution systems is essential.

The post is superannuable and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with the names of two referees, should be addressed to the undersigned within 14 days from the appearance of this advertisement.

ROBERT FIFE,
Group Manager.

Riverbank Gas Works,
Kilmarnock.
June, 1956.

ESTIMATOR.—Preferably with experience in Industrial Pipework layouts, required for company with Headquarters in the North West. Apply No. 285, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

DESIGNER DRAUGHTSMAN.—Preferably with experience in Industrial Pipework layouts, required for company with Headquarters in the North West. Apply: No. 286, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

WALES GAS BOARD

CHIEF ACCOUNTANT'S DEPARTMENT
APPOINTMENT OF ASSISTANT CHIEF ACCOUNTANT

APPLICATIONS are invited for the above appointment for which the salary payable will be in the range £1,525 to £1,725, the commencing salary being fixed in relation to experience and qualifications. The post is pensionable.

The selected candidate will be required to pass a medical examination.

Candidates should be qualified accountants, and preferably have had experience in public utility accountancy, including costing, estimating, machine accounting, and the carrying out of organization and methods examinations.

Applications, stating age, particulars of appointments held, experience and qualifications, together with the names of two referees, should reach the undersigned by June 19, 1956.

C. B. MAWER,
Secretary.

2, Windsor Place,
Cardiff.

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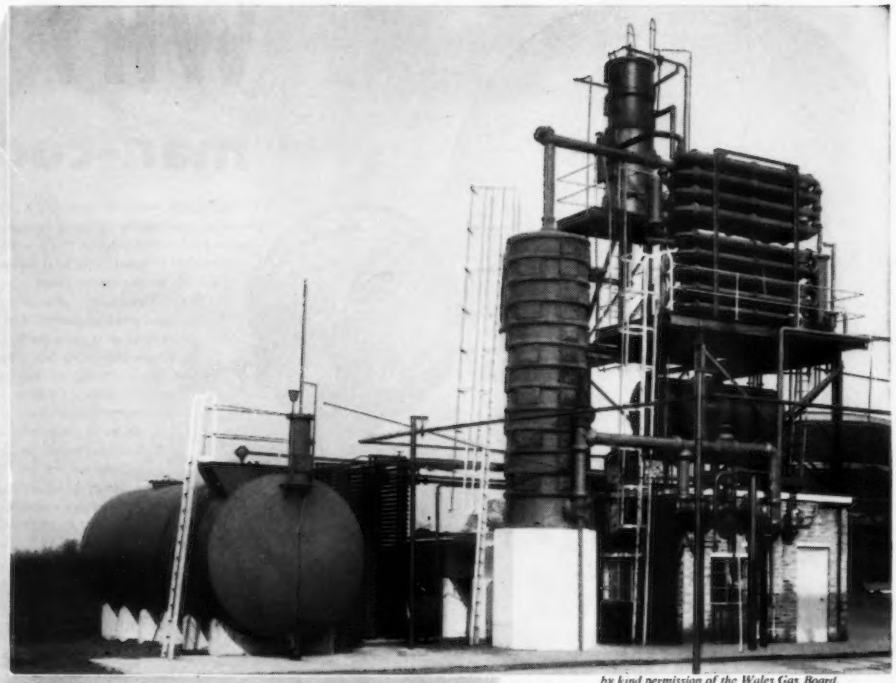

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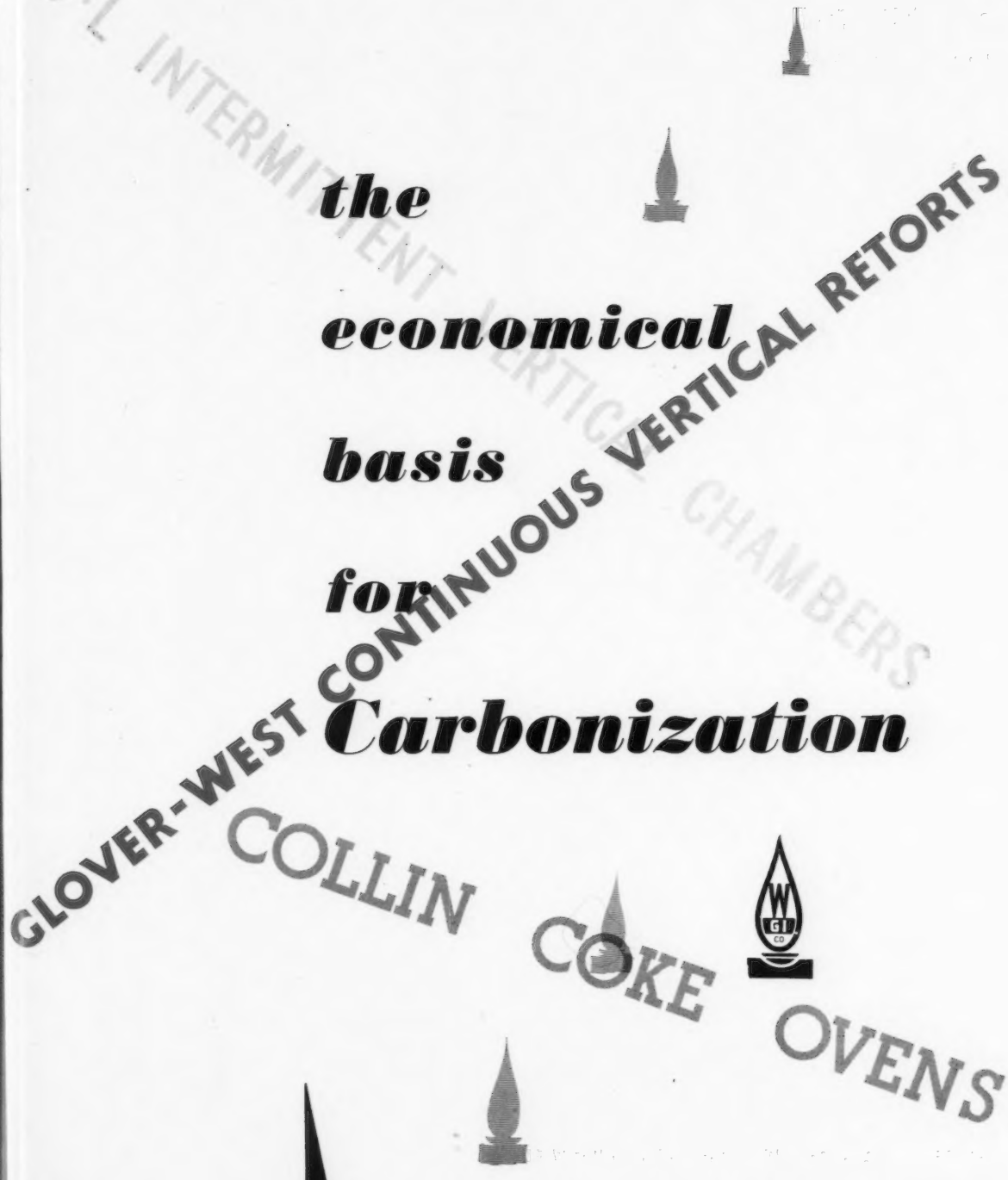
C.O.L INTERMITTENT VERTICAL CHAMBERS



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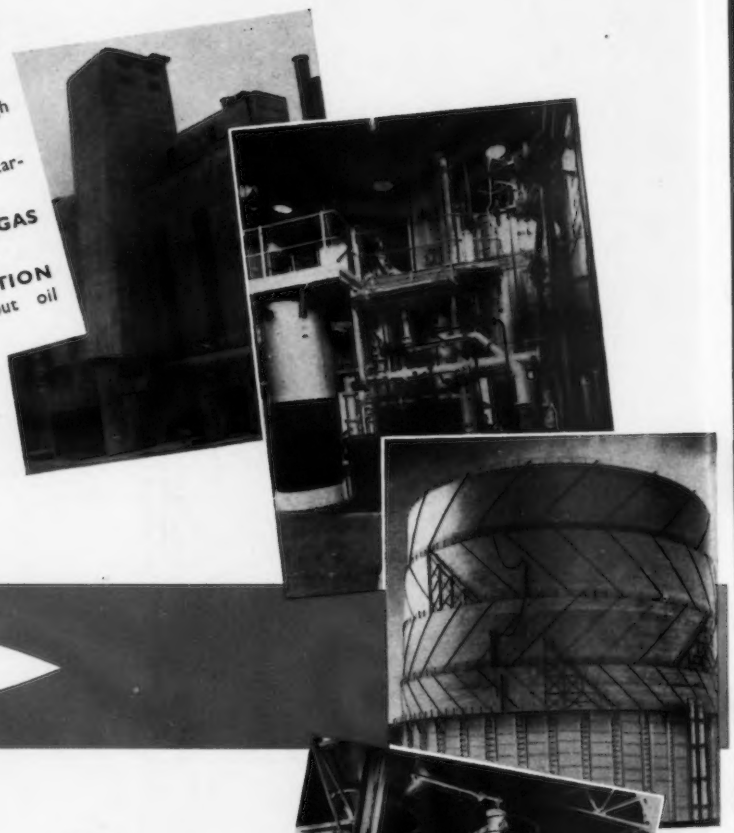

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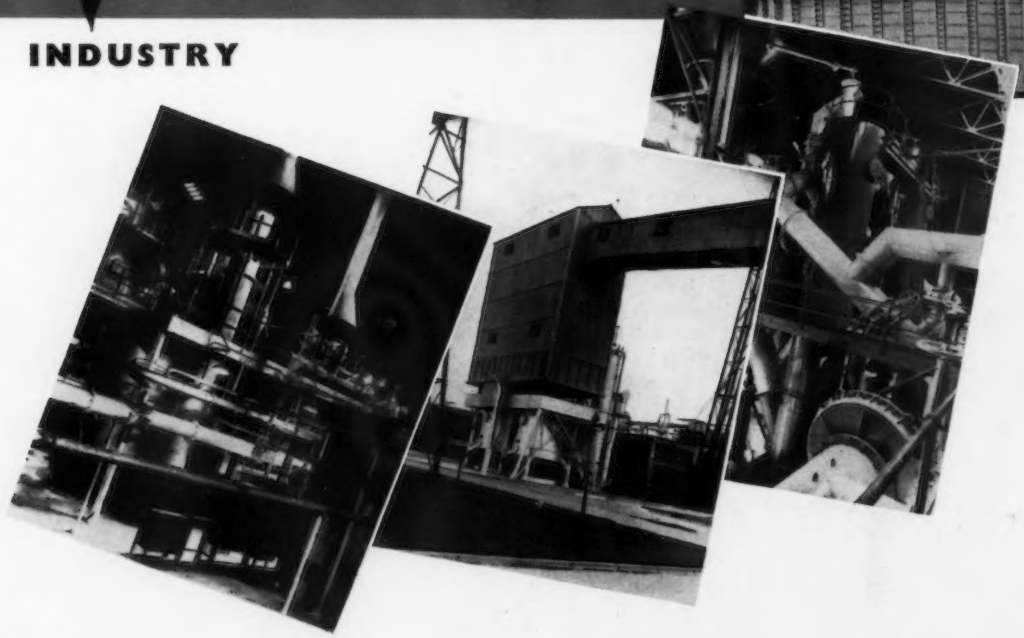

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